



FRIDAY, APRIL 11.

Automatic Electric Protection for Draw-Bridges.

The Union Switch & Signal Company has recently introduced a new and complete signal apparatus for railroad draw-bridges, which seems calculated to effectually protect a train from running into an open draw.

By referring to accompanying plan it will be seen that two interlocking machines are used, one being placed on the abutment near each end of the draw. Derailing switches are placed in each track approaching the draw, about 500 ft. from the point of danger. Home signals are placed 100 ft. from switches, and distant signals are placed 1,500 ft. from home signals. About a mile from the draw in either direction insulated sections of track, or track instruments, are located and connected by line wire to bells *c* and *d*, placed near interlocking machines to serve as annunciations of trains. Electric locking is also applied to the machines in such a manner that a train receiving clear distant signal is secured the right of way over the draw, which cannot be opened until the train has passed it.

There are five levers in each interlocking machine, the first, lever No. 5 next to draw in cabin *A*, is connected to draw-bridge lock No. 5; No. 4 lever to No. 4 switch, No. 3 lever to No. 3 Saxby & Farmer facing-point switch lock, No. 2 lever to home signal No. 2, and No. 1 lever to distant signal No. 1. Those in machine *B* are connected in like manner.

It will be noticed that the bridge lock, switch and signals connected with machine *A* are at danger, and switch No. 4

line. Lever No. 6 being moved unlocks the bridge and locks lever No. 7 so that switch No. 7 cannot be moved to main line.

The signals and switches on both sides of the bridge being at danger, the draw can be opened, and as soon as the draw begins to move the bridge lock-levers Nos. 5 and 6 are automatically locked so that they cannot be again moved until the draw is again in position to receive bolts Nos. 5 and 6.

This being the case switches No. 4 and 7 cannot be set, or signals cleared for main line, until the draw is in position, and has been locked by lock-bolts Nos. 5 and 6. Hence, if an approaching train disregards danger signals 1 and 2 or 9 and 10, it is positively put on the siding, in preference to allowing it to run into the river.

The automatic electric locking of the levers by the presence of a train upon the rail after receiving a clear signal is one of the most important features of interlocking of switches, signals and draw-bridges, and no interlocking is absolutely safe without it.

The First Five Years of the Railroad Era.

(Copyright 1884)

(CONTINUED FROM PAGE 254.)

To present the time and incidents of the "Stourbridge Lion" the first locomotive run on this continent, I have to continue my personal narrative.

The First Locomotive Run on a Railroad on this Continent, Aug. 9, 1829, at Honesdale, Pa., on the Railroad of the Delaware & Hudson Canal Company.—Early in the summer of 1829 I had received the appointment of Chief Engineer of the South Carolina Railroad, a road to extend from Charleston, on the ocean, to a point opposite to Augusta, Ga., on the Savannah River, a road of about 150 miles in length, but I was not to go to Charleston to com-

and that the time would come when I should look back with great interest to the ride that was now before me."

The locomotive, having no train behind it, answered at once to the movement of the hand, and there being no doubt as to the result, a motion was had at once in which there was not any evidence of distrust; soon the straight line was run over, the curve was reached and passed before there was time to think as to its not being passed safely, and soon I was out of sight in the three miles' ride alone into the woods of Pennsylvania.

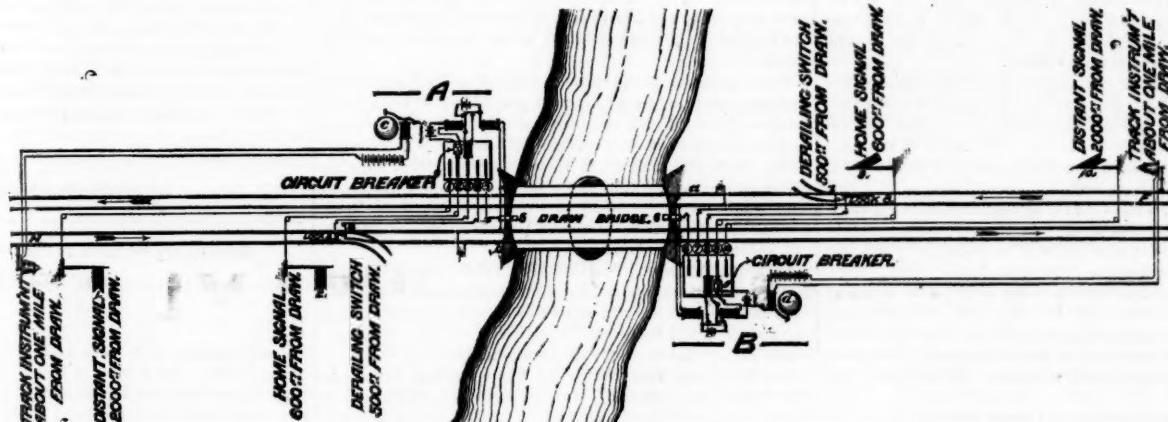
I had never run a locomotive or any other engine before; I have never run one since; but on that 9th of August, 1829, I ran that locomotive three miles and back to the place of starting, and, being without experience as a brakeman, I stopped the locomotive on its return at the place of starting. After losing the cheers of the lookers-on, the only sound, in addition to that of the exhaust steam, was that of a timber structure when the parts are brought into the bearing state.

Over half a century passed before I again revisited the track of this first ride on this continent. Then I took care to walk over it in the very early morning, that nothing should interfere with the thoughts and feelings that, left to themselves, would rise to the surface and bring before me the recollections of the incidents and anticipations of the past, the realization of the present, and again the anticipations of the future.

It was a morning of wonderful beauty, and that walk alone will, in time to come, hold its place beside the memory of that ride alone over the same line, the interval being more than 50 years.

Again, in order to present the facts that it is the object of this narrative to present, I have to refer to my personal acts as a civil engineer.

In September of 1829 I was at Charleston, S.C., to enter on my duties as Chief Engineer of the South Carolina Railroad. I had already learned the general character of the country the road was to pass through, and the first question to be decided



AUTOMATIC ELECTRIC PROTECTION FOR DRAW BRIDGES.

opened to derail trains, and those connected to machine *B* are at safety for trains to cross the draw.

The manner of operation is as follows: A train approaching from *H* passing over track instrument announces itself through electric bell *c*, everything being as shown in plan. The operator desiring to let it pass proceeds to set the tracks as shown on opposite side of draw. The first and only lever in machine *A* that can be moved is lever No. 5, and that only when the draw is in position to receive lock bolt No. 5. When this lever has fully completed its function derailing switch lever No. 4 is unlocked, and it in turn is the only one that can be moved. This being moved sets switch No. 4 to main line, and unlocks Saxby & Farmer facing-point lock lever No. 3, and at the same time locks lock-bolt lever No. 5, so that it cannot be moved until lever No. 4 has been again set to derail trains. Lever No. 3 being moved, locks switch No. 4 at the switch, insuring its being fully over in position. It also locks lever No. 4 at the machine, and at the same time unlocks lever No. 2, so that signal No. 2 can be cleared. Lever No. 1 is now moved, which clears signal No. 1 and locks lever No. 2 in the cabin.

By making these movements, which can only be made in the above order, at machine *A*, the switch and signals will be set like those shown in connection with machine *B*. The approaching train arriving at signal No. 1, and it being clear, automatically locks facing-point lock lever No. 3 in this position and holds it locked out of control of the operator, until the rear of the train passes over the draw, when it is automatically unlocked, and the operator is free to change signals and switches and unlock the draw so that it may be opened.

By referring to switch and signals connected with machine *B*, which, as said before, are set for train to pass over the draw, the only lever in the machine that can be moved is lever No. 10, by movement of which signal No. 10 is put to danger, which unlocks lever No. 9. Lever No. 9 being moved sets signal No. 9 to danger, which locks lever No. 10 and its signal to danger and unlocks Saxby & Farmer facing-point lock lever No. 8 (provided no train is between signal No. 10 and the draw). Lever No. 8 being moved unlocks switch lever No. 7 and locks signal No. 9 to danger. Lever No. 7 being moved sets switch No. 7 to derail trains and unlocks bridge lock lever No. 6 and locks lever No. 8 so that it cannot be moved until switch has again been set for main

mence my duties until September. Being thus at liberty in July and August I volunteered to go to Honesdale and take charge of the transfer of the locomotive from the canal boat to the railroad track, within 20 ft., and about 18 ft. above the level of the canal boat.

The line of road was straight for about 600 ft., being parallel with the canal, then crossing the Lackawaxen Creek, by a curve nearly a quarter of a circle long, of radius 750 ft., on trestle-work about 30 ft. above the creek, and from the curve extending in a line nearly straight into the woods of Pennsylvania.

The road was formed of rails of hemlock timber in section 6 x 12 in., supported by caps of timber 10 ft. from centre to centre. On the surface of the rail of wood was spiked the railroad iron—a bar of rolled iron 2½ in. wide and ¾ in. thick.

As the locomotive was seen in mid-air, in its transference from the canal to the railroad, the opportunity was had to see that the axles had an unyielding parallel position, there being no king-bolt that provided facility for passing round the curve, and that, therefore, the four wheels holding their rigid position were to be forced round the curve by the power of the steam-engine. The locomotive thus seen altogether impressed the lookers-on as being of great weight. The road having been built of timber in long lengths, and not well seasoned, some of the rails were not exactly in their true position when the time came that they were to carry the locomotive in its onward movement.

Under these circumstances the feeling of the lookers-on became general that either the road would break down under the weight of the locomotive or, if the curve was reached, that the locomotive would not keep the track, and in its onward motion without support it would dash into the creek with a fall of some 30 ft.

On my part, I knew that the road would carry the locomotive safely, and that the curve would be passed without any difficulty.

But when the time came, and the steam was of the right pressure, and all was ready, I took my position on the platform of the locomotive alone, and with my hand on the throttle valve handle, said: "If there is any danger in this ride it is not necessary that the life and limbs of more than one should be subjected to that danger; that, having no doubt whatever, I was about to take the ride entirely alone,

was that of the motive power to be used. I was prepared to submit a report on the subject at once. But before stating the character of that report and the decision of the board it is pertinent that it be clearly understood what was the state of the question on both sides of the Atlantic as to the motive power to be used on a railroad intended for general freight and passenger transportation.

On this side of the water some 16 miles of the Baltimore & Ohio road had been constructed and was worked by horse power.

On the other side of the Atlantic the Liverpool & Manchester Company was the only company that had the subject under consideration, but as yet had not come to a decision, although their Chief Engineer, George Stephenson, was the able and earnest advocate of the locomotive.

In their measures to have before them the fullest information on the subject the company submitted the question of the motive power for the Liverpool & Manchester Railroad to two eminent civil engineers for their judgment, after the most thorough examination.

Report of Two Eminent Civil Engineers in Favor of Stationary Engines Acting Through Long Ropes.—The two engineers were James Walker, of London, and John U. Rastrick, of Stourbridge.

The two engineers concurred in an elaborate report, presenting their conclusion and plans in great details.

That conclusion was not in favor of locomotive power, but was in favor of a succession of stationary engines transmitting a tractive force by use of long ropes.

No more impressive reference to the undeveloped character of the locomotive in England, in 1825, can be presented than that found in the following extract from "Wood on Railroads," 1825:

"Nothing can do more harm to the adoption of railroads than the promulgation of such nonsense (italic in the original) as that we shall see locomotives traveling at the rate of 12 miles per hour."

It is hardly necessary to add that in a second edition a few years later this caution of "Wood on Railroads" is not to be found.

In addition to the preceding, as showing that the locomotive had not in 1825 the position, in fact and feeling, that it rose to in a very few years, and so greatly below that it holds now, there is the remarkable item of history, that in

1829 the Liverpool & Manchester Railroad Co deemed it necessary to appeal to the mechanical ability of the country, by a premium of \$2,500, and the purchase of the locomotive, to obtain a locomotive that would haul on a level railroad *three times its own weight at ten miles the hour*.

To the knowledge of a general character as presented above was added the personal knowledge of the locomotive as a tractive power as briefly presented herein, and the results of a practical study of the locomotive in its daily operation, at the only place in the world where the locomotive was in operation to be studied.

Report to the South Carolina Railroad Company in September, 1829, in favor of Locomotive Power as the Tractive Power on Their Railroad of 150 Miles Long, for General Freight and Passenger Transportation.—In that report was presented an estimate of the cost of transportation by horse power and by locomotive power. The estimate of cost by locomotive power was based on facts obtained on the Stockton & Darlington Railroad.

The result of that comparison was in favor of locomotive power, and the report contained a decided recommendation that locomotive power should be the power to be used on the South Carolina Railroad.

But the basis of that official act was not the simple estimate resting on the facts as they existed on the Stockton & Darlington Railroad, but, as was stated in the report, was on the broad ground that in the future there was no reason to expect any material improvement in the breed of horses, while in my judgment the man was not living who knew what the breed of locomotives was to place at command. Contrast the eight-wheel locomotive of this day with the four-wheel locomotive of the Stockton & Darlington road, and find some evidence that the position then taken was well taken, and then bear in mind that the end is not yet.

This report was submitted at a full meeting of the board, every member in his seat and the President in his chair. Without leaving their seats the decision was unanimous.

The resolution then passed, and placed on record, was the first act by a corporate body in the world to adopt the locomotive as the tractive power on a railroad for general passenger and freight transportation.

The South Carolina Railroad—Its Construction.—The South Carolina Railroad was of the age of wooden rails capped with iron. Confidence and capital had not yet reached the growth to make an iron track of the most modest weight per yard a possibility, and steel rails were as unthought of as the telegraph.

On timber rails, 6 in. x 12 in. section, iron bars $2\frac{1}{2}$ in. x $\frac{1}{4}$ in. were spiked. The wood was the Southern pine, the hard, resinous surface of which was as suitable for the iron bars as wood could be.

I desired to use iron of the same width and thickness, but with a flange on one edge, but the cost per mile multiplied by 150 had too large a product for the treasury of the company; and the expense was incurred only on the curves, which, being few and small in extent, the expense was admissible.

The limit of weight under each wheel where the road was of the material and combination of necessity used, and the equal necessity of more power in one locomotive and under the command of one engineer, led naturally to the combination allowing the use of more wheels, and thereby providing more boiler, and therewith a less severe action on the road than was the case with the four-wheel locomotive with its overhanging fire-box.

Report to South Carolina Railroad Company as to the Necessity of Six and Eight-Wheel Locomotives.—The necessity of such provision led to the submission of a special report on the subject, in which the necessity was fully presented, and in which were described the parts and combinations by which provision was made for the change in the direction of road and the changes in grade, accompanied by the plans in detail.

The provisions thus made and introduced are those now in use in six and eight-wheel engines. In the freedom from severe action on the road was attained a result of specially great value when the road was a combination of wood and iron. The authority to incur the responsibility and expense was not easily obtained. The fact that the combination was new was almost too great an objection for the necessity, plain as that necessity was.

The special objects sought in the six and eight-wheel combination were fully attained, viz.: that of locomotive of the steam-making capacity, determined by the weight to which each of eight wheels was limited by the material and construction of the railroad, together with the equal distribution of the weight, and the necessary provision for changes in direction and changes in grade. Since that day the numerous improvements of the eight-wheel locomotives, especially in this country, have sustained what was introduced so early a date, and again it is to be said, "The end is not yet."

One result of the early introduction of the eight-wheel locomotive has been of indirect benefit to every railroad corporation in the country.

The well-informed in the railroad history of this country will recollect the successive trials in connection with the use of the eight-wheel passenger cars, claimed to be made under valid patent. In the four-wheel engines the boiler carried the cylinders, and was, in fact, the frame carried by the running gear. In the eight-wheel engine the boiler in like manner carried the cylinders, and, in fact, was the frame carried by the swiveling trucks.

To form the eight-wheel passenger car it was only necessary to substitute for the boiler a long body of a passenger car, to be carried by the same swiveling trucks, and the

eight-wheel passenger car existed. The models presenting this substitution in court decided the question.

The first time over 100 miles were run in continuous line was on the South Carolina Railroad.

It will be readily understood that in this early use of a railroad by locomotive power the railroad appliances of various kinds were matters of necessity, but without antecedents. To any one who may happen to know what was devised and done at that early day it is pertinent and fair to say that the engineer on whom rested the responsibility of providing the indispensable also knew with what difficulty the capital, in that day of small capital and little confidence, had been provided by subscription to the stock of the company, and with what greater difficulty any addition to that capital could be had until success had attended the original sum provided. It was, therefore, an indispensable condition of every plan to be devised that its cost must come within the capital provided.

With such determination was this condition kept in view that it was pleasantly repeated remark, in after times, for the engineer to be introduced by a former director as the engineer who had built and put in operation a railroad within his estimate.

Trial of Locomotive Service in the Night.—To one incident in this early use of the locomotive on a long road for general freight and passenger transportation reference will be made, not as of any value in itself, but in this case as of interest in my recollection of the attendant circumstances.

That the locomotive was to be used in the night, and during the whole night, was plainly to be anticipated. It was thought well to make trial of such running by night, that it might be known what it was necessary to provide. For such trial two platform cars were placed in front of the locomotive. On the forward platform was placed an inclosure of sand, and on the sand a structure of iron rods somewhat of urn shape. In this structure was to be kept up a fire of pine-wood knots. Suitable signals as to the rate of speed, etc., were provided. The day preceding the evening of the trial closed in with as heavy a fog as I have ever seen, and I have seen a first-class London fog. But the fog did not prevent the trial when the appointed time came.

The country to be run through was a dead level, and on the surface rested this heavy fog; but just before we were ready to start, the fog began to lift and continued to rise slowly and as uniformly as ever curtain left surface of stage until about 18 ft. high; there it remained stationary, with an under surface as uniform as the surface it had risen from. This under surface was lit up with radiating lines in all directions with prismatic colors, presenting a scene of remarkable brilliancy and beauty.

Under this canopy, lit on its under surface, the locomotive moved onward with a clearly illuminated road before it; the run was continued for some five miles with no untoward occurrence, and I had reason to exclaim, "The very atmosphere of Carolina says, 'Welcome the locomotive.'"

The five years that follow the five years that have been thus summarily referred to are not without interest in relation to the part taken in this country in the further development of the railroad era. And when we come to the time when the night was made available to travelers on railroads with so great economy of time and with so much comfort it is found that very much of personal interest originated in this country.

It is well and pleasant to know that of the two English-speaking peoples by whose action the railroad era was opened and has been developing, we, on this side of the waters that intervene, but do not separate, have in the past fully done our part.

To extend this knowledge to many to whom it will be of interest is the object of these few pages put into print.

They who in the knowledge of the past and study of the present are prepared to speak of the future may say "that while the end is not yet," the place in this great era earned by this country in the past will be sustained in the future.

Railroad Gauge.—The distance from edge to edge of the two iron rails that form the railroad track is called the railroad gauge.

As the gauge of the railroads in the North in the United States was practically, it may be said incidentally, decided during the five years referred to, it is pertinent to these statements to refer to its origin.

The gauge of the Stockton & Darlington Railroad, a coal-mine railroad, determined the gauge of the railroads in the United States.

When George Stephenson, having been Chief Engineer of the Stockton & Darlington Railroad, became the Chief Engineer of the Liverpool & Manchester Railroad, he adopted 4 ft. $8\frac{1}{2}$ in., the gauge of the Stockton & Darlington Railroad, as the gauge of the first railroad to be constructed for general freight and passenger transportation; there is no statement as to the grounds of this important decision.

It is plain that there were some conditions to be complied with in connection with the Stockton & Darlington road that made the use of the half inch of value. It is also plain that there were no such conditions on the line of the Liverpool & Manchester Railroad. Why that liberty was not used we have no knowledge.

When the time came for action as the width of gauge in the United States, at the North, there was also no limitation, but again the coal-mine railroad gauge of 4 ft. $8\frac{1}{2}$ in., was adopted, because it was the gauge of the Liverpool & Manchester Railroad, and in their turn as other railroads were built at the North, the 4 ft. $8\frac{1}{2}$ in., gauge was adopted. In only two cases were there omissions to follow the precedent thus established.

One was by the South Carolina Railroad Company, who,

in accordance with the report of the Chief Engineer, adopted 5 ft. as the width of gauge on their railroad.

In that report were presented, as far as known at that time, the conditions to be complied with in reference to the locomotive, the railroad cars, freight and passenger, with due reference to cost of road-bed.

This action of the South Carolina Railroad determined the gauges of the Southern roads, which continue of that gauge to this time; but it is to be anticipated that the commercial advantages of uniformity of gauge will eventually narrow the gauge down to the coal-mine gauge of 4 ft. $8\frac{1}{2}$ in.

The other case referred to is that of the Erie Railroad. The gauge adopted for that road was 6 ft., known as the broad gauge. Of that gauge were the 75 miles, known as the Eastern Division, and used for many years.

When the time came that it was believed that provision had been made to build the road to Lake Erie the question was raised again as to width of gauge. Being at the time Consulting Engineer of the company the question was referred to me.

In the report submitted in reply the conditions as to locomotives and railroad cars were made the basis of the judgment, and again the 5 ft. gauge was the conclusion.

The conclusion was concurred in as an engineering question, but the action of the company was to adhere to the broad gauge, and mainly for financial reasons.

Many years afterward the commercial advantages of uniformity of gauge caused the change of gauge to the 4 ft. $8\frac{1}{2}$ in. gauge.

PERSONAL REFERENCE TO THE DELAWARE & HUDSON CANAL COMPANY.

The reference in the preceding statements to the early action of the Delaware & Hudson Canal Company in the use of railroad transportation, and specially to their order for first locomotives, after the locomotives in use on the Stockton & Darlington Railroad; and the reference to my connection with the construction of the Delaware & Hudson Canal, which led to the important railroad trusts placed in my hands, afford me the opportunity of expressing therewith, what I have always felt, my appreciation of the professional obligation I was under to the Delaware & Hudson Canal Company, and to their Chief Engineer, John B. Jervis, by whose counsels their action was determined.

HORATIO ALLEN.

Contributions.

Secondary Strains of Statically Structures.

II.

There remains little to be said to complete the exposition of Manderla. Let a joint in which four members meet be considered. The stiff top chord will bend so that the tangent to its curve will lie below the altered sides 1-2 and 1-5 see fig. 8)*. The curves form certain angles in point 1 with their straight chords (1-2, 1-3, 1-4, 1-5). These tangential angles are termed "angles of deviation." If one of them, for instance, the angle \angle_1 for line 1-2, is known, all others are also known. For the deformed angles 213, 314, 415 differ from the original angles by $\Delta\alpha$, $\Delta\beta$, $\Delta\gamma$, whilst the tangents to the elastic curves preserve the exact original angles α , β , γ . Hence if Z_1 were known:

The angle of deviation of 1-3 would be

$$= \alpha - (\alpha + \Delta\alpha - Z_1) = Z_1 - \Delta\alpha$$

The angle of deviation of 1-4 would be

$$= (\alpha + \beta) - (\alpha + \beta + \Delta\alpha + \Delta\beta - Z_1) = Z_1 - \Delta\alpha - \Delta\beta$$

The angle of deviation of 1-5 would be

$$= (\alpha + \beta + \gamma) - (\alpha + \beta + \gamma + \Delta\alpha + \Delta\beta + \Delta\gamma - Z_1) = Z_1 - \Delta\alpha - \Delta\beta - \Delta\gamma$$

At every other joint point there is a similar angle of deviation Z , as Z_2 for point 2, Z_3 for point 3, etc.

The angle Z_1 is positive if it lies below line 1-2, and the final result of calculation will show, by the sign of Z whether it was correct to assume it as a positive value. Positive angles of deviations go with positive moments (pressure in top fibres) of the members.

The Z_1 , Z_2 , etc., supposed to be known, the other angles of deviation can all be expressed, and as these are identical with T_1 , T_2 of equation (1), the moment of flexure at each end of each member can be formed according to this equation (1).

The sum of the moments of the members meeting at a joint must be nil. In this manner as many equations can be formed as there are joint-points, and these equations contain a number of unknown Z equal to their own number. All equations are of the first degree, and their solution is only a matter of patience. This being done, and the Z found, the moments M_1 and M_2 of each member can be calculated as well as the strains, and the curves can be drawn.

Let the method be applied to a 100-ft. 5-panel railroad span, 20 ft. deep, designed to carry 3,000 lbs. per ft., and a permanent load assumed to be 800 lbs. per ft. (see Fig. 9). The modulus is assumed to be 28,300,000 lbs. (2,000,000 kilo. per square centimeter, in order to be the same as in Continental calculations). The moment of inertia I , the corresponding distances d of the fibres most strained,

* This and the other figures mentioned will be found in the preceding number, pages 256 and 257.

the values $\rho = \sqrt{\frac{S^2}{EI}}$ and the corresponding values K and L are next calculated and the results made up in a table.

Member.	Length inches.	Area square inches.	Moment of inertia I .	d inches.	Live strain S	Total strain lbs. P/t : pressure tension. lbs.
1-2	339	10	225	5.68	84,840 P	108,000
2-3	240	15	194	5.76	90,000 P	114,000
3-6	249	15	194	5.76	90,000 P	114,000
1-5	240	7.5	5.62	1.5	60,000 t	76,000
5-4	240	7.5	5.62	1.5	60,000 t	76,000
4-7	240	11.25	8.43	1.5	90,000 t	114,000
2-4	339	8.0	6.00	1.5	42,400 t	80,000
2-5	240	9.0	6.25	2.5	30,000 t	38,000
3-4	240	9.0	6.25	2.5	0

Member.	$\frac{S}{\sqrt{\frac{S^2}{EI}}}$	$EI = \frac{l}{100,000} \times 100,000$	K in inch pounds. $L = \frac{1}{100,000} \times 100,000$
1-2	1.24	188	714
2-3	0.97	228	882
3-6	0.97	228	882
1-5	4.6	6.6	40
5-4	4.6	6.6	40
4-7	4.6	10	61
2-4	5.3	5	32
2-5	3.1	7.4	38
3-4	0	7.4	30

Bars 3-7 and 6-4 with I only = 0.16 are neglected.

Thereupon the values $\frac{A}{l} = \frac{S}{E^s}$ are calculated. They are small fractions,

$$\frac{n}{100,000}$$

For 1-2 2-3 3-6 1-5 5-4 4-7 2-4 2-5 3-4 the values n are -16 -21 -21 +28 +28 +28 +19 +12 0 Now the alterations of angles, of each triangle of the truss, are calculated with formula (4) at the end of the paper. Uniform load being supposed, the two halves of the truss are symmetrical. The following table gives numbers indicating by how many 100,000th parts of a unit each angle is increased or diminished:

Differences of Angles.

Triangle.	Angle	$n =$	Angle	$n =$	Angle	$n =$
125	125	44	215	28	152	-72
254	524	9	245	-7	254	-2
234	324	-19	342	-40	234	+50

The difference of angle 347 = -25, and that of 436 = 24. Differences of total angles at

$$\begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \\ 28 & 34 & 83 & -74 & -72 \\ \text{sums} & \dots & +165 & 165 & \end{array}$$

With the aid of these alterations (see fig. 10) the expressions for T_1 and T_2 are formed. They may be found on fig. 11. And now using the above values K and L , the moments are built up as follows :

$$\begin{aligned} M_1 &= -40 Z_1 - 12 (74 - Z_1) \\ M_1 &= 714 (28 - Z_1) - 385 (34 - Z_2) \end{aligned} \quad \text{Their sum is } 0.$$

$$754 Z_1 - 12 Z_2 - 385 Z_2 = 6014.$$

In the same manner for point 2.

$$M_2 = 882 Z_2 - 463 (83 - Z_2)$$

$$M_2 = 32 (Z_2 + 19) - 8 (65 - Z_2)$$

$$M_2 = 38 (Z_2 + 10) + 13 (Z_2 - 2)$$

$$M_2 = -714 (34 - Z_2) + 385 (28 - Z_1)$$

$$1666 Z_2 + 463 Z_2 + 8 Z_2 - 385 Z_1 = 51,483$$

In the same manner the sum of moments for each of the points 4, 3, 5 is formed, and finally the following five equations are obtained :

$$754 Z_1 - 385 Z_2 - 12 Z_4 = 6014 \text{ for point 1.}$$

$$1666 Z_2 + 463 Z_3 + 8 Z_4 + 13 Z_2 - 385 Z_1 = 51,483 \text{ for point 2.}$$

$$1382 Z_3 + 15 Z_4 + 463 Z_2 = 74301 \text{ for point 3.}$$

$$144 Z_4 + 12 Z_2 + 8 Z_2 + 15 Z_3 = 5918 \text{ for point 4.}$$

$$118 Z_3 + 12 Z_4 - 12 Z_1 + 18 Z_2 = 3770 \text{ for point 5.}$$

Only the first term of the left side of each equation is very considerable, so that the equations can be solved by approximation. Thus for the points :

$$\begin{array}{cccccc} 1 & 2 & 3 & 4 & 5 \\ \text{1st approximation, } Z = 20 & 20 & 44 & 32 & 27 \\ \text{2d } " & Z = 19 & 21 & 49 & 33 & 29 \end{array}$$

The maxima moments are now calculated with formula (1) :

$$\begin{array}{llll} \text{Member 1-2} & M_1 = 1806 & M_2 = -5103 \\ " 2-3 & M_2 = 2780 & M_3 = -20815 \\ " 3-6 & M_3 = 19781 & M_6 = -19781 \\ " 1-5 & M_1 = -1300 & M_5 = -2028 \\ " 5-4 & M_5 = 692 & M_4 = -1212 \\ " 4-7 & M_4 = 1886 & M_7 = -1886 \\ " 2-4 & M_2 = 1024 & M_4 = -704 \\ " 2-5 & M_2 = 1529 & M_5 = -1429 \\ " 3-4 & M_3 = 870 & M_4 = 615 \end{array}$$

As a check the moments will be added for each joint-point. Their sum must be nil. Small differences may be distributed.

It is seen that the eye bars 1-5 experience strains at the

$$\begin{array}{l} 1.5 \\ \text{eyes of } 2,028 = 550 \text{ lbs. per square inch. But as at the} \\ 5.62 \end{array}$$

eye the moment of inertia is not 5.62, but over 80, the extra strain at that particular point is only about 1 per cent. of the specified strain.

The moment at the top of the end post is 5103, and the extra

strain arising therefrom is 130 lbs. per square inch. This post is without any dangerous strain. But at 3 the maximum moment of the top chord is 20815, and the strain therefrom is 610 lbs. per square inch. This is 6 per cent. on the specified maximum strain, and $\frac{610}{7,600} = 8$ per cent. on the intended maximum pressure of this member.

If the joint-plates at 3 and 6 of the truss were properly extended, a very small amount of extra material there would reduce the secondary strains to a mere trifle. The extra moment is equivalent to an eccentricity of the primary

$$20,815$$

strains of $\frac{20,815}{114,000} = 0.19$ inch. If the pins, instead of

$$114,000$$

passing through the true gravity line of the top chords, only passed through the centres of the 9-in. channels, an extra strain of over 3,300 lbs. per square inch would be produced. Sufficiently long and strong reinforcing plates at the joints also reduce the maximum strains at such points.

In Germany, two firms have commenced building bridges which are pin-jointed throughout. The tensile members are, however, broad flats, with their eyes riveted on, and there are many short pieces at the joints. One of these firms builds bow-strings with pin joints at all points of connection. The secondary strains of such structures were calculated to be 12 per cent. of the specified maximum strain, or twice as much as found for the 5-panel 100-ft. span.

Professor Steiner, of Prague, a gentleman known by his report as one of the Imperial Austrian Commissioners to the Philadelphia Exhibition, has calculated the secondary strains of a 3-panel triangular girder 12 meters long, 4 meters deep in the centre and 2.9 meters deep over the middle point of the end panels. The chords are supposed to consist of T bars 8 in. \times 4 $\frac{1}{4}$ in. \times 0.6 in., the end diagonals of 8 in. \times 0.6 in. flats, and the two remaining ties of 4 $\frac{1}{4}$ in. \times 0.6 in. flats. The panel loads were 34,000 lbs. each. These are the results:

End posts.	Top chords.	Bottom chords.	End diagonals.
Primary strains, ... 8,700	11,200	6,600	9,600
Secondary strains compared with the primary ones, per cent.	34	17	36
		27	12

Again, Herr Manderla has calculated an all pin-jointed triangular deck-bridge built in Germany. It is 36 meters long; depth 1:9.3, and it has 9 panels. It is built with end posts. There were found secondary strains in the end bottom chords of 172 per cent., and in the first top chords of 66 per cent. It is supposed that these strains were relieved by the turning motion of the pins, which is known to be easy in triangular girders on account of the reversal of web strains. But the frictional co-efficient is certainly higher than assumed in some of the German publications, for the pin pressure often exceeds the elastic limit at points of maximum pressure, and friction increases for high specific pressures (see Trautwine's Pocket-Book). Others who have studied secondary strains in bridges have found 32 and even 100 per cent. in Warren girders, 24 and 35 per cent. in quadrangular riveted girders (Fachwerk), and as much as 180 per cent. over the middle piers of continuous girders.

Since the writer drew attention to the considerable extra strains of such structures in case of unequal temperature, the subject has been taken up in Germany, and the writer's calculations were confirmed. Professor Steiner has lately used Manderla's method to calculate the secondary strains arising in ordinary trusses from the same cause combined with the rigidity of the joints, and he found that a difference of temperature of 18 degrees Fahrenheit between the chords of certain structures may produce extra strains of 7 per cent. of the specified maximum strains. Such differences of temperature have been repeatedly observed.

All the examples calculated are those of very simple designs, for the labor of calculating the secondary strains of complex designs requires an amount of heroic patience possessed by few. It must also be expected that under certain one-sided loads still higher strains may be found; and this increase is considerable, so far as the writer's calculations extend. Structures with inter-riveted members, or with numerous redundant members, such as the lattice bridge (now deservedly fallen into disuse), must experience very much greater secondary strains. Each intermediate connection by a rivet produces a new joint, makes the bars shorter, and renders them more unable to assume their deformed positions. These bridges, to be as strong as well-designed trusses, must be heavier.

The secondary moments not only influence the members of a bridge, but especially their joint-plates or their pins. If these are used also for the top-chords and bottom-chords of bridges without eye bars, they may have to bear very material torsional strains. For instance, the above calculated 100 ft. quadrangular truss, if arranged with pin-jointed chords at point 3, would cause a torsional strain of 4,000 lbs. per square inch of a 3-in. pin, which would have to be added to the shearing strain as usually calculated. On the other hand, the pins at point 5 receive only torsional strains of 400 lbs. in the 100-ft. quadrangular truss as here supposed.

Where riveted connections are used, the moment of resistance of the rivets must equal the secondary moment. It must also be borne in mind that the plates or bars are weakened at the joints, where they should be stronger than anywhere else. These remarks especially refer to the bottom chords and to the tensional diagonals of riveted bridges.

The secondary strains influence more especially the stiff members, and hence the compression members, which can least endure moments of flexure. The greater the secondary

strains of a structure, the greater should be the factor of safety against crippling. Compression members built as braced posts require long strong starting plates, and many rivets at those points where the secondary moments attack them. The usual battens, with perhaps three rivets on each side, are not sufficient. On account of the posts of some European bridges being built very wide, with insufficient bracing and starting plates between the parts, the strains were found to be unequally distributed over the diagonals and bottom chords.* Indeed, Herr Gerber, President of a bridge firm of great experience, and builder of the well-known Mainz bridge (constructed 25 years ago), in a report to the German Architects and Engineers' Society expressly stated in the year 1876 that certain permanent deformations of European bridges could be traced to the fact that they were calculated for a certain condition of their joints, which does not exist in practice.

The result of the whole investigation, and especially of that relating to continuous girders, shows that apparent stiffness is often far from being identical with strength. This identity cannot be obtained without careful calculation of the forces and strains at the joints as well as of the main members, good proportions of scientifically designed lateral and oblique bracing, and the central intersection of the gravity lines of the members meeting at every joint. If it were not possible strictly to fulfill the last condition, the lighter braces must be connected with members, sufficiently strong, stiff and specially proportioned for the purpose, as near to the true centres as possible. The new details, which the writer introduced into practice several years ago, fulfill these conditions, and the structures built on this principle are as stiff as the best-built riveted bridges, but without their additional strains.

And, finally, this is a general principle, enunciated by the French savant, M. G. Lamé, no less than 20 years ago, in that elegant and forever classical work, "Leçons sur la Théorie Mathématique de l'Élasticité des Corps Solides." Given certain definite strains per square inch, which members shall bear, that structure which has the least deflections of its joint points is also that of the smallest volume, or "the greatest stiffness and the highest economy coincide."

The secondary strains of such structures would be nil if this perfection were strictly possible.

LONDON, 1888.

CHARLES B. BENDER.

The Credit for the Locomotive Due Trevithick.

CAMDEN, N. J., April 8, 1884.

To THE EDITOR OF THE RAILROAD GAZETTE:

Referring to the article in the *Gazette* entitled "The First Five Years of the Railroad Era," prepared by the venerable Horatio Allen (the first part of which was published in your number of the 4th inst.), I beg leave to call attention to the following facts in connection therewith, which it seems to me, should not in justice be overlooked.

In the paragraph entitled "The High Pressure Engine, The Noncondensing Engine, and the Locomotive Engine," Mr. Allen says:

"But the results of the trials made were not of the character to make the locomotive date from the time and acts of Trevithick and Vivian, and some years were to pass before locomotive, built under the direction of George Stephenson, was put to work on a mine railroad at Killingworth, near New Castle."

By reference to the original papers (which I record as authentic), left by Richard Trevithick and republished in "The Life of R. Trevithick" (by Francis Trevithick, his son), it will appear that the locomotive which he placed in service on the Merthyr Tydfil Railway in South Wales did satisfactory work in hauling cars to and from the iron works there as early as 1803 and 1804. In this locomotive, although the first one placed in actual service, the exhaust steam was carried to the stack to increase the draught; it had many good points, and proved beyond all doubt that the adhesion of the smooth driving-wheels to the rail was sufficient for all traction purposes in connection with the locomotive engine.

The fallacy which was the incentive for the construction of Blenkinsop's engine of 1812, with spur wheels working in a rack rail, did not mislead the early locomotive builders until eight years after Trevithick's smooth-wheeled engines had been successfully used in hauling "ten tons of iron, five wagons and 70 men, riding on them the whole of the journey," over an iron tram road "above nine miles."

While it is not my desire to detract from the fame of George and Robert Stephenson, who attained the reputation of being the leading civil engineers and locomotive builders of their time, I feel that, in justice to Trevithick, to whom the credit is due of inventing and operating the first successful locomotive that ever did service on an iron railroad, a more extended notice of his early efforts should have appeared in this connection, as no one who will take the trouble to look into the matter can doubt that the reason for his failure to become famous as the "Father of the Locomotive" was not caused by the fault of the machine which he constructed, but of the imperfectly constructed track upon which it ran. Had this track been built of strong rails properly secured in position the accident which

* The Dutch engineers have lately introduced saddles to transfer the floor loads uniformly over both webs of the respective chord. The apparatus of Professor Fränkel was used in testing such a bridge, and the strains in the diagonals were found to be equally distributed.

** The engine was described by Richard Trevithick as follows: "In working order weighs about 5 tons. Its cylinder was 8 $\frac{1}{4}$ in. diameter, with a stroke of 4 $\frac{1}{2}$ ft. It took empty wagons up an incline of 2 in. in a yard at forty strokes a minute, progressing 9 feet at each stroke. The steam is turned up the chimney about 3 ft. above the fire. The fire burns much better when the steam goes up the chimney than when the engine is idle."

caused his locomotive to be abandoned would not have occurred.

Mr. Allen also says: "Had Evans had a Bolton, as Watt had a co-operating Bolton, or a Pease, as George Stephenson had his Pease as a co-operator, the high-pressure steam engine, both as a stationary and as a tractive motive power, would have had a position from that time of great interest to this country and through this country to the world." I think Oliver Evans' true worth as an inventor can be more fairly judged by what he did than by what he claimed.

Had Trevithick been as fortunate as Watt and Stephenson were in obtaining the co-operation of capitalists who had enough faith in him to advance the funds for the improvements in the construction of his early locomotive, which certainly possessed great merit, the value of his services would have been fully understood then, and he would not have been compelled to wait until this late day to receive only a tardy recognition of his merits from those who care

who was then on his way home to win the laurels in connection with the "Rocket," in the construction of which in 1829 were embodied many of the principles which Trevithick had introduced 25 years before.

J. E. WATKINS.

Gauge of Track and Car-Wheels.

The following important circular of inquiry has been issued by Mr. M. N. Forney, Secretary of the Master Car-Builders' Association, to general managers, superintendents and officers in charge of the maintenance of way and track departments of rail roads:

SIR: The Master Car-Builders' Association have under consideration the adoption of a standard for the gauge of car-wheels, and for the form of their treads and flanges. Before taking final action with reference thereto it is desirable that reliable information should be obtained regarding the prevailing practice in laying track, locating frogs, guard-rails, etc., on the different roads of the country. Investigations which have been made have shown that the differences in the gauge of car-wheels on various roads are

tion with reference to this subject to guide the master car-builders in establishing a standard for the gauge of wheels. Therefore by answering the following questions or instructing the proper officer to answer them you will assist the members of the Car-Builders' Association in making the standard gauge for wheels conform to that of the rails on which they must run:

1. What is the gauge of the track of your road?
2. Do you measure the gauge at the point A or B on the rail* shown in fig. 1?
3. How much space do you give on tangents for flange-way between the guard-rail and main rail, as indicated at N, figs. 3 and 4?
4. How much space do you give for flange-way at M between the frog point and wing rail?
5. How much at T, in the throat of the frog?
6. Do you measure the flange-way between the points A or B, fig. 1, on the rails?
7. Do you either widen or narrow the gauge on a tangent at G, fig. 3, opposite to the points of frogs? If so, how much?
8. Do you either widen or narrow the gauge of turn-outs, at F, opposite to the points of frogs? If so, how much?

Fig. 1.

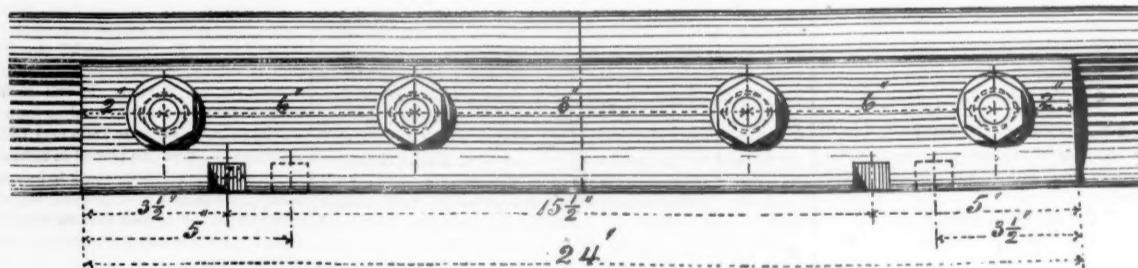
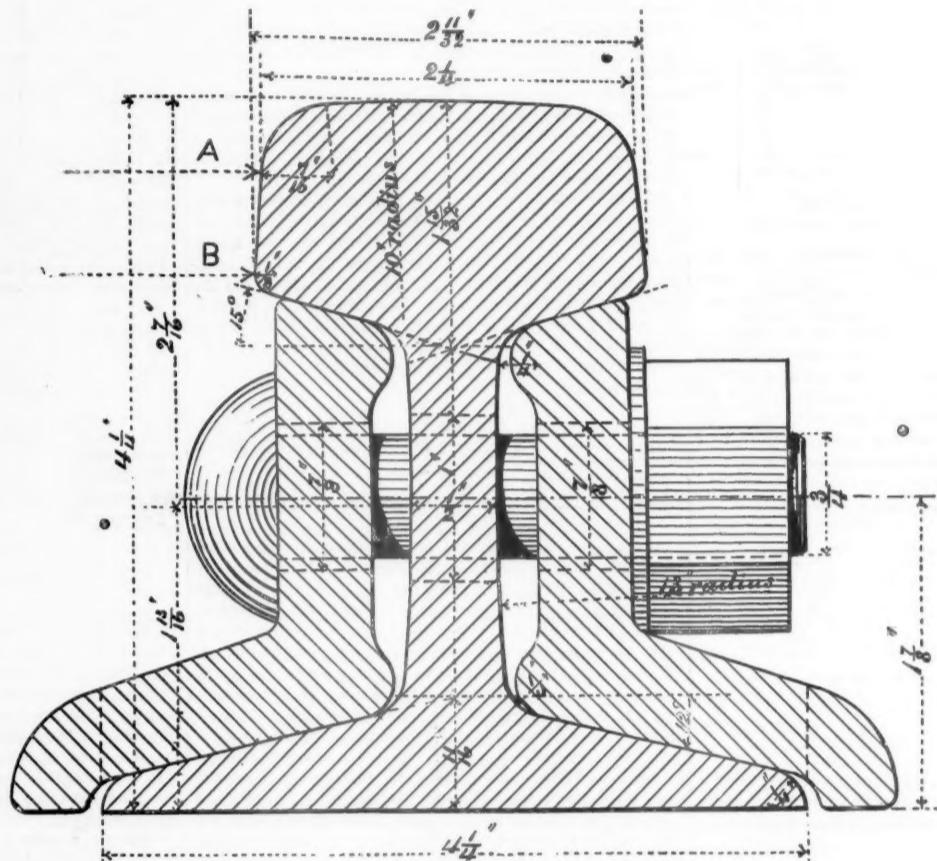


Fig. 2.

RAIL SECTION AND RAIL JOINT.

(The rail section and joint used here for illustration are the standard rail and joint of the New York, Lake Erie & Western Railroad.)

to take the time and trouble to review carefully the circumstances in connection with the introduction of his locomotive on the Merthyr Tydyl Railway in 1804 and the successful locomotive subsequently exhibited on the circular track at Euston Square, London (the "Catch-me-who-can") in 1808.

In locomotive building, as in other things, "nothing succeeds like success," and poor Trevithick, whose peculiarities of disposition were such as to prevent him from enjoying the full benefits of his labor and genius, was compelled to borrow £50 to take him back to England from Cartagena, where he had accidentally met Robert Stephenson in 1827,*

* Jefferson, in his "Life of Robert Stephenson," page 105, says:

"Another addition was made to the party in the person of Trevithick, whom Robert Stephenson accidentally met in a hotel (1827) without funds and without credit. Trevithick, after undergoing indescribable hardships in exploring the Isthmus, had made his way foot sore and almost starved to Cartagena."

"An instructive study was that made gaunt, half-starved Cornish giant, eager for fresh knowledge, liberal, daring, self-reliant and original in all questions pertaining to his own profession, but on all other subjects untaught and unobservant."

"There is no doubt that the original and daring views of Trevithick, with respect to the capabilities of the locomotive, made a deep impression on Robert Stephenson."

This acknowledgment coming from the biographer of Robert Stephenson, should have more than ordinary weight in a controversy.

so great as to be an obvious source of much danger, and, it is believed, a prolific cause of accidents. Inquiry has indicated that similar discrepancies exist in the laying of tracks, the location of frogs, guard-rails, etc.

That there are some very serious defects in the railroad practice of this country is indicated by the large number of derailments which occur here. During the five years previous to 1883 there were 5,837 accidents reported in the *Railroad Gazette* record, of which 3,545, or over 66 per cent., were derailments. During the same period 5,191 accidents were reported to the Railway Department of the British Board of Trade, of which only 410, or less than 8 per cent., were derailments. These figures become still more significant when it is remembered that the British statistics are collected by authority of the government, and are probably very nearly correct, whereas the *Railroad Gazette* record is made up chiefly from reports gathered from the newspapers, and probably includes only a small proportion of all the derailments which occur in this country, as these are seldom reported in the newspapers, unless some serious injury to persons or property is caused thereby. The great difference in the number of accidents of this class which occur here compared with those reported to the Board of Trade, is no doubt due in some degree to the superior condition of the permanent way of British roads; but the disproportion is so great that there must be some other grave defects in our lines, or in the rolling stock, or probably both, to cause so many more accidents of this kind here than occur on the foreign lines.

The purpose of this circular is to collect definite informa-

9. How much space do you give on turn-outs for flange way, at K, between the turn-out rail and guard rail?

10. How much at L, between the frog-point and wing rail?

11. Do you make any change in the gauge of track opposite to frogs when they are laid on either the inside or the outside rails of curves on main line?

12. How much space do you give at N for flange-way between the guard-rail and main-rail when frogs are laid on curves?

13. How wide do you make the gauge of switches at H, fig. 5?

14. How wide do you make the gauge of main track at R, fig. 5, in front of switches?

15. How much throw do you give to split switch rails, as indicated at X, fig. 5?

16. What is your rule for widening the gauge on curves of main line?

17. What is your rule for elevating the outer rails on curves above the inner rails?

It would also assist in this inquiry if you would furnish the Secretary of the Master Car-Builders' Association a tracing, or blue-print, similar to figs. 1 and 2, showing the

*If the sides of the heads of the rails are vertical and not inclined, as in the engraving, it of course makes no difference from what point on the side the gauge is measured, but if the side of the head is inclined, as in the engraving, there will be a very material difference in the gauge if measured at A from what it would be if measured at B.

Fig. 5.
Plan of Switch.

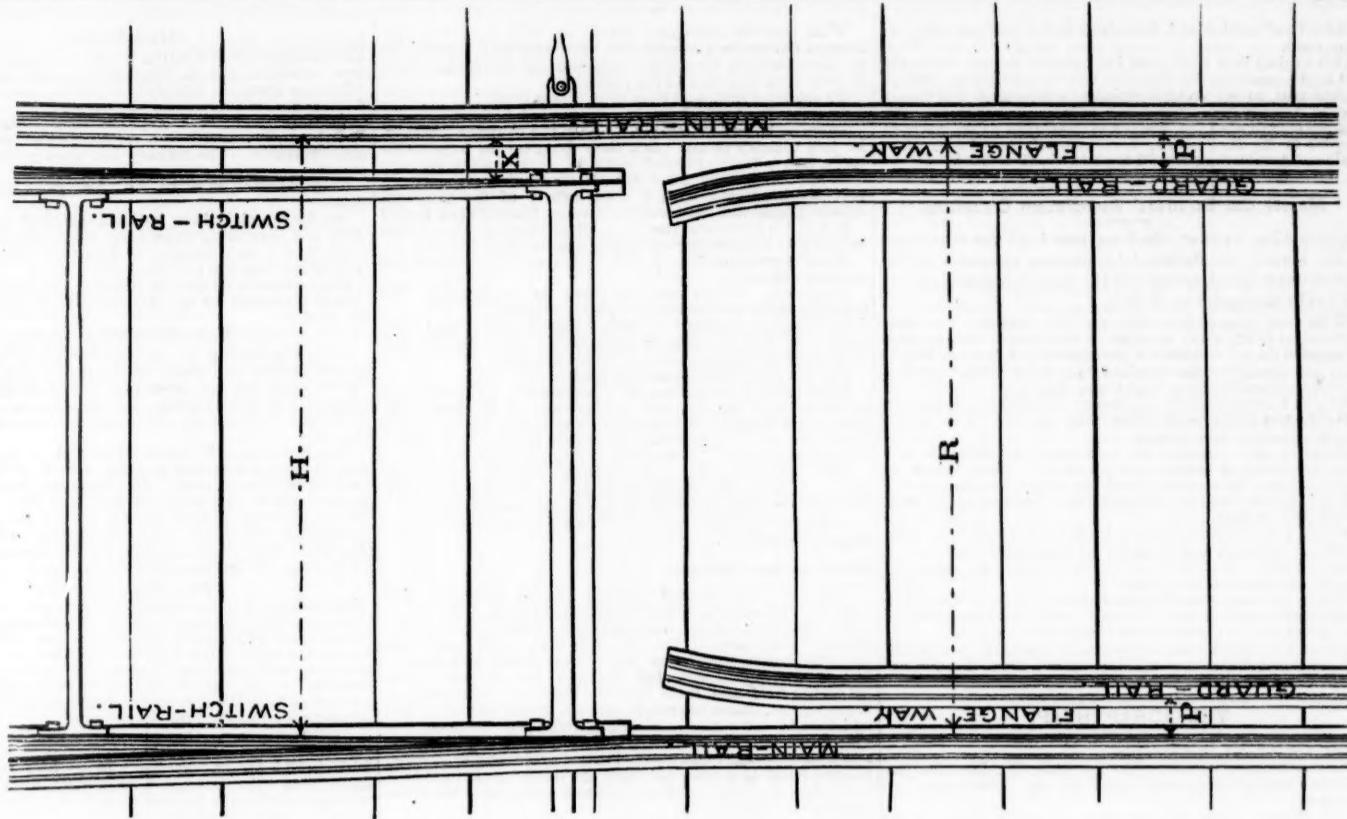
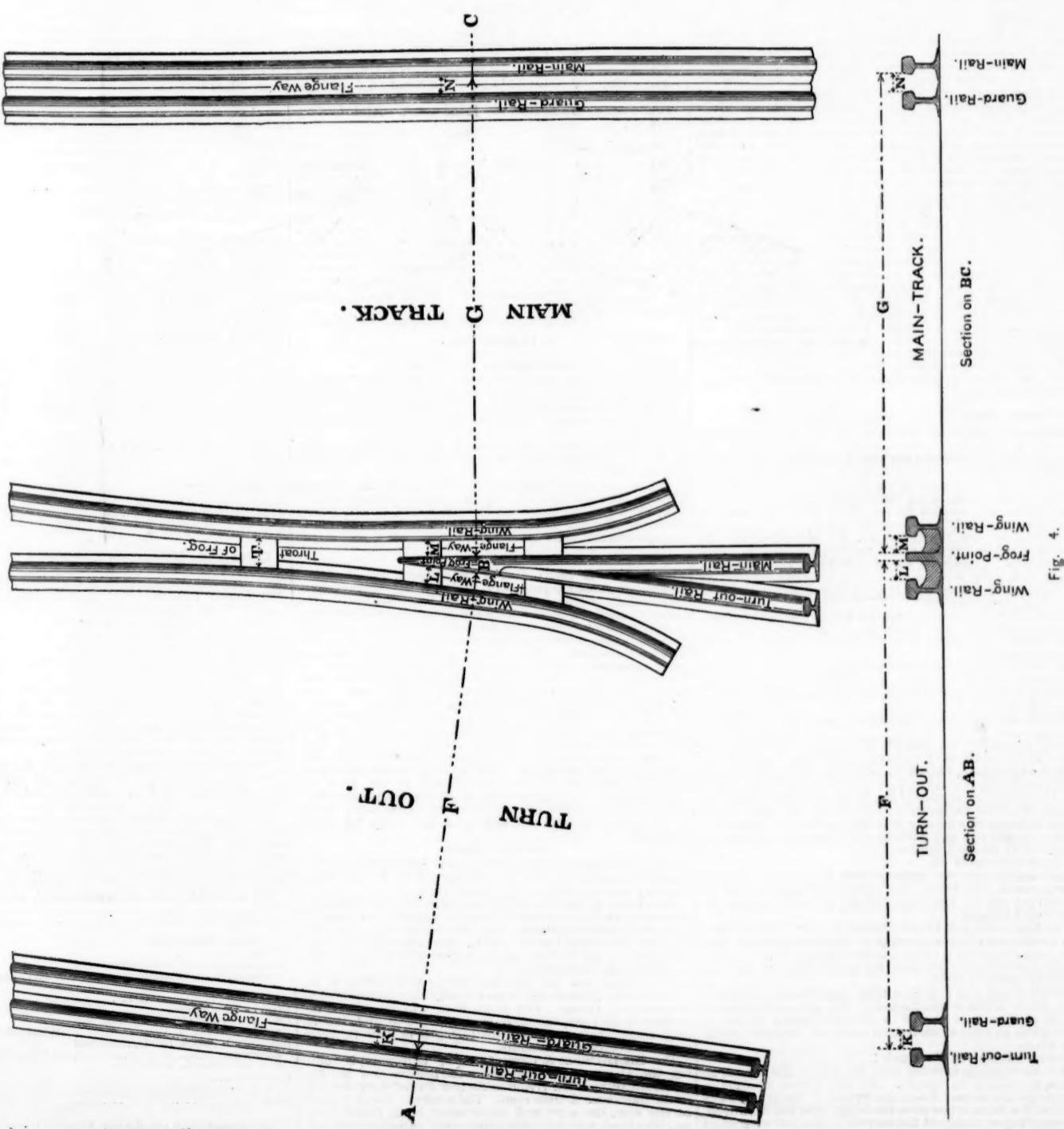


Fig. 3.
Plan Showing Main Track, Turn-ont, Frog and Guard Rails.



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standard rail-section and fish-plates which you are using on your road.

This subject is of such great importance to the railroads and to the public in this country that it is hoped the officers of railroads, to whom this circular will be sent, will either answer it themselves or refer it to the proper person, with instructions to send the desired information as promptly as possible to M. N. Forney, Secretary of the Master Car-Builders' Association, No. 73 Broadway, New York.

Master Car-Builders' Association Circulars.

The following circular has been issued by the committee of the Master Car-Builders' Association, appointed to report on brake-shoes, beams and the interchangeable part of the brake arrangements of cars:

With your experience what do you consider the most economical brake-shoe, wrought or cast-iron or the so-called "Congdon Shoe" (which is a combination of both metals)?

Do you think that the so-called "Congdon Shoes" are better than either cast or wrought-iron shoes?

Do you think truss-rods applied to brake-bars are useful?

Would you recommend either iron or steel as a substitute for wooden brake-bars?

What do you consider the best—solid brake-heads and shoes combined, or independent heads and shoes, made so that shoes may be removed from the head and renewed?

What do you consider the safest and most durable way of hanging up brakes?

Would you recommend that brakes be applied to both trucks of each car, and if so, should they be connected?

Do you think that the Congdon Shoe wears or cuts steel tires more than cast-iron shoes?

Would you recommend what is known as the "Christie" brake-head for adoption? If not, will you state what, in your judgment, is the best brake-head and shoe?

Answers to this circular should be sent as early as possible to L. Packard, Chairman of Committee, New York Central & Hudson River Railroad, West Albany, New York.

THE SCRAP HEAP.

Good Rules for Employes.

The Addison & Northern Pennsylvania Co. includes the following among its general rules for the government of employes:

"All officers, agents and employes of this company will be required to reside where their services are needed, and use every effort in their individual spheres toward the successful operation of its railway property. They must be prompt in attendance at appointed hours, day or night. They must not absent themselves without permission of the General Superintendent. They must become familiar with the regulations of the company, observe the rules themselves and strictly enforce them upon those under their control. They must report any misconduct or negligence which may come to their knowledge detrimental to the interests of the company, or the safety of the road. Employes will be held responsible for the intelligent performance of their duties; for the proper use and protection of all property intrusted to their care, and for any injury to persons or property resulting from their misconduct or neglect. Those whom business brings into contract with the general public must, when on duty, present a neat personal appearance. They must be civil and respectful in their demeanor, and should they at any time meet with great provocation, they must not give way to passion, but note the facts of the case, report them to their immediate superior and avoid all altercation with those doing business with the company. They are strictly forbidden playing cards or gambling in any form at any station or in the cars. Persons addicted to the use of intoxicating liquors will be denied employment and employes known to use at any time intoxicants will not be retained in the service of the company. Those intrusted with car or switch keys must receipt for the same and not allow them to go out of their possession until returned to the company, and all persons before leaving the service must turn over to the proper officer all property of the company in their possession at the time."

A French View of the Baggageman.

There is employed on the railroads of this remarkable country a sub-officer who combines within himself the strength of a Hercules, the ferocity of a Bengal tiger, and the destructiveness of an African baboon. It is a combination of qualities rare in a state called civilized.

This terrible person is the Baggageman.

His official designation varies, but I give the name by which he is popularly known everywhere.

Fortunately this Hercules-tiger, this all-destroying official, confines the exertion of his terrible qualities to inanimate objects; he does not exercise it upon human beings. This is well, for if the passengers should become the subjects of his terrible wrath traveling in this country would be more dangerous than war.

In private life the baggage-smasher is an estimable citizen. He greets his fellow men pleasantly, he is amiable, jovial, a good fellow. Sometimes he is an excellent husband, and an affectionate father.

But when he is placed upon his baggage car he becomes altogether a different person. The sight of trunks, valises, the other innocent impedimenta of the traveler intoxicate him with fury.

He is filled with a sort of Berserker rage; he is a Malay running amok.

Pause and regard for yourself this train which comes to arrive at the terminus of railroad. The long baggage car is filled with trunks, valises, carpet-sacks, what not. A man of sentiment might stand and philosophize over them. Here are the charming costumes of the bride, the sober wraps of old age, the little garments of the babe; the robes of the priest, perhaps, side by side with the outfit of the gambler; youth and age, vice and innocence, wisdom and ignorance, all peacefully mingled together.

Strange epitome of life!

The baggage-smasher, however, does not stop to indulge in sentimental reflections. His object is to empty his car in the shortest possible time and with the greatest possible destruction of baggage.

Watch now the broad open door of the car. From it issue in a torrent bags, valises, trunks of every size, boxes. It is to be seen that there is method in his madness, for the smallest, the most fragile come first, the ponderous and solid are launched on top of these.

Here is a light bag flattened under a ponderous Saratoga; there a little trunk crushed beneath the iron-bound sample case of a drummer; yonder a delicate looking trunk, its cover gone, its sides shattered, its contents scattered to the four winds.

Sinister effacement of a trunk!

Then the baggage smasher is in his glory. He dances, he shouts, he swears, he laughs. He is a demon, exulting in the ruin he has made. From the fortress of his car he looks down with a Satanic leer upon the baggage he has destroyed. He seems to jeer madly at the travelers who look with silent despair upon the ruin of their property.

What does the American, usually so ready to act in defense of his person and property, do to this destroyer? Does he take summary vengeance upon him and lynch him? Does he even turn him over to the police?

He swears a little and then buys a new trunk!

Strange country! Inexplicable people!

There is, however, some excuse for the baggage-smasher. In this country people pack their baggage in huge structures, larger than a Flemish cottage. Is it strange that the unhappy man who must handle these unwieldy masses becomes impressed with a wild hatred of the monsters which oppress him, and seeks to revenge himself upon them?

It is in his favor also that he confines his vengeance to the trunks and does not harbor malice against their owners.

What becomes of this jovial destroyer, this terrible yet amiable official?

Frequently in this country there are accidents. The baggage car is then crushed to pieces or upset.

The baggage-smasher is then found buried under the trunks which he would have smashed; he is himself wrecked or crushed flat as the pancakes of the country.

The destroyer has become the destroyed!

Sometimes, if he survive, he is promoted. He becomes a conductor and has reached the summit of his ambition. Henceforth baggage is to him only a dream of the past. He looks upon his successor with the same interest with which the general regards the aspiring young sergeant.

The baggage-smasher is the product of an imperfect civilization, in which the individual finds it sometimes necessary to use violence as a protection against the majority.

In France we have a perfect civilization—and there are no baggage-smashers!

Wanted to Change.

The case being argued was old Farmer Closegrip vs. a railroad company for damages sustained in a collision.

The old man's lawyer was making a pitiful appeal to the jury—"Gentlemen of the jury," he said, "just gaze upon the true, honest, time-beaten face of my client, and suppose he had been fatally wounded; think of the sad blow that his loving wife and little innocent children would have to receive; but, thank heaven, it was not so bad as that. But, oh! what he must have suffered during those long days of his illness—how the heart-stricken companion of his life felt when they brought him home, bruised and mangled. Now, tell me, shall this poor old man go down to his grave a maimed and helpless creature without some aid from the cause of his affliction?"

During this delivery Closegrip was noticed to be very much agitated, and rising as the lawyer finished, he sobbed—

"Judge, 'scuse my breakin' in, but I must speak."

"Go on," commanded the Court.

"I didn't know it wer so bad as it air till the gentleman that set down; an' if ye'll let me, I'll—I'll—" here he faltered.

"You'll what?" asked his honor.

"Just raise them figgers on the railroad for a few dollars more—make it a thousand instid o' five hundred; won't ye, judge?"

It is needless to add that the judge didn't.—*Atlanta Constitution.*

Narrow Escape.

Several parties on yesterday's First Atlantic are responsible for the following story, which is given for what it is worth: As the train was passing through Corfu, the engineer noticed an old man about to cross the track just ahead. He sounded the whistle, but apparently without effect, and the old man, who was very much bent over and was smoking a clay pipe, continued to advance until he reached the edge of the track, when the cross-beam of the locomotive struck the pipe and knocked it from his mouth. Strange to say, the man himself was untouched, and hurriedly backed off to a safe distance.—*Rochester (N. Y.) Democrat and Chronicle*, April 8.

TECHNICAL.

Locomotive Building.

The Concord Railroad shop in Manchester, N. H., have just completed a heavy passenger engine specially intended to run the White Mountains and Montreal express trains during the summer, when the travel on those trains is very heavy.

The Schenectady Locomotive Works, in Schenectady, N. Y., have an order for 10 locomotives for the Wisconsin Central road.

Mr. A. L. Rowe represents in New York the firm of Thomas W. Godwin & Co., of the Virginia Iron Works at Norfolk, Va. Mr. Rowe has his office at Room 45, Boreel Building, No. 115 Broadway. The Virginia Works build locomotives and other machinery.

Car Notes.

The Jackson & Sharp Co., in Wilmington, Del., has just completed three sleeping cars, built for the Trans-Andine Railroad, in the Argentine Republic, South America. The entire framework of these cars is built of iron, that material having been adopted chiefly because the country to which they are going does not yield any native timber which could be used for repairs. The interior of these cars is finished with mahogany, richly carved. The head-linings are of bird's-eye maple veneer. The seats are upholstered with leather, and the floors are carpeted with Wilton carpet. Each car has a sleeping compartment of 10 sections, which is divided by a bulkhead, with communications through a swinging door. One division contains six sections, intended for the use of gentlemen, and the other four for ladies. Each of these compartments are provided with the usual conveniences, washbasins, etc. The sleeping berths are handsomely finished, and all the small details of the work are very complete. The cars are carried on trucks equipped with 36-in. Paige steel tire wheels. These cars now being loaded at Wilmington, and will sail in a few days for South America.

Bridge Notes.

Breden & Chapman have started a new establishment in St. Louis to be called the Western Bridge & Iron Works. They will pay especial attention to bridge work.

The Penn Bridge Co. at Beaver Falls, Pa., has taken the contract for a highway bridge over the Beaver River between Rochester and Bridgewater, Pa. The bridge will have one span of 160 ft. and two of 200 ft. each; there will be two wagon-ways 12 ft. wide and a foot-walk 8 ft. wide. The contract price is \$25,000.

The bridge over the St. John River, at St. John, N. B., for which the Dominion Bridge Co. has the contract, is to be a cantilever bridge. The main span will be 477 ft. the centres of the piers, the shore arms being 143 and 190 ft. long respectively, making a total length of 810 ft. from centre to centre of abutments.

The Hoopes Stone & Cement Co., of Baltimore, is building the abutments and piers for the bridges over the Big and Little Gunpowder rivers on the new Philadelphia Branch of the Baltimore & Ohio road. The artificial stone is made on the spot, the sand and small stone being found in the neighborhood, and the stone crusher and incorporating machine being erected at a convenient point.

Iron Notes.

The Standard Steel Casting Co. has commenced work in its new establishment at Thurlow, Pa., and has recently received an order for \$200,000 of steel castings to be used in fitting out some vessels for the navy.

The Pottstown Iron Co. will blow out its blast furnace at Pottstown, Pa., in a few days, in order to make repairs and improvements. The furnace has been running about five years.

Sligo Furnace, at Sligo, Mo., has gone out of blast for repairs.

The Keystone Rolling Mill in Pittsburgh started up last week and is running single turn, employing about 200 men.

The new Cilico Furnace in Chattanooga, Tenn., is completed, and was put into blast April 5.

The Lackawanna Coal & Iron Co. has an order for 10,000 tons of steel rails for the Wisconsin Central's new branch to St. Paul.

Manufacturing Notes.

Robt. Wetherill & Co., in Chester, Pa., are building the engines, boiler, and other machinery for the new cable railroad roads for the Market street and Union Passenger railroad companies in Philadelphia. The engines are to be of 500 H. P. each. They have also a number of orders for Corliss engines.

The Globe Iron Works in Cleveland, O., are building an iron steamship intended to carry ore from Lake Superior ports to the lower lakes. The vessel is a double-decker, 247 ft. keel, 262 ft. over all, 37 ft. deep, and 22 ft. molded depth. Her water bottom, deck and the sides of the lower hold will be covered with wood. She will be fitted with three masts. The Globe Iron Works are also building an iron steam tug, 75 ft. long, for the International Bridge Co., of Buffalo.

The Rail Market.

Steel Rails.—The market is quiet, with not many additional sales reported. As noted last week, there are many orders which could be placed if the makers were willing to accept bonds, but most of the mills are unwilling to do business on anything else but a cash basis except with companies of established credit. Quotations may be put at \$33.50 to \$34.50 per ton at mill, the price depending somewhat upon the size of the order and the time of delivery.

Rail Fastenings.—Quotations are nominally unchanged, remaining at \$2.50 per 100 lbs. for spikes in Pittsburgh, \$2.75 to \$3 for track-bolts and 1.75 to 1.85 cents per pound for splice-bars. The demand is very light, however, and there is some competition for orders, and it is said that a large order for spikes was taken last week at \$2.35 per 100 lbs.

Old Rails.—Business is a little more active, and there is quite a demand for small lots. Quotations are very variable and may be put at \$2.10 to \$2.20 for tees at tidewater and \$2.20 to \$2.40 for double heads. But these prices are somewhat beyond what buyers are willing to pay.

A Suggestion.

It would be a good thing for passenger engineers to give some signal when they are flagged to let the flagmen know that they are seen. It puts a flagman in a bad position when an engineer runs right up to him and then puts on his air brakes, as he will sometimes run by three or four car-lengths.—*Hornellsville (N. Y.) Times.*

ANNUAL REPORTS.

The following is an index to the annual reports of railroad companies which have been reviewed in previous numbers of the current volume of the *Railroad Gazette*:

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Cleveland, Columbus, Cincinnati & Indianapolis.

This company owns lines from Cleveland, O., to Columbus, 138 miles; Delaware, O., to Springfield, 50 miles, and Galion, O., to Indianapolis, 203 miles; a total of 391 miles. The report is for the year ending Dec. 31.

The company also leases the Mt. Gilead Short Line, from Levering, O., to Mt. Gilead, 2 miles. It leases and practically owns the Cincinnati & Springfield, from Springfield to Cincinnati, 80½ miles. It owns the Indianapolis & St. Louis, from Indianapolis to Terre Haute, 72 miles, and, through that organization, leases the St. Louis, Alton & Terre Haute, from Terre Haute to East St. Louis, 189 miles, with a branch to Alton, 4 miles. This makes 847½ miles leased and controlled, but the earnings and operations of these lines are not given in the report.

The equipment consists of 168 locomotives; 86 passenger, 6 sleeping, 7 postal and 19 baggage and express cars; 2,663 box, 588 stock, 629 flat, 1,379 coal and 62 caboose cars; 1 director's car, 1 pay car and 12 service cars.

The equipment of the Cincinnati & Springfield road consists of 16 locomotives; 15 passenger and 8 mail and baggage cars; 274 freight cars. The equipment of the Indianapolis & St. Louis includes 51 locomotives; 20 passenger, 3 postal and 10 baggage cars; 841 box, 169 stock, 139 flat, 537 coal and 23 caboose cars; 12 gravel cars.

The general balance sheet, condensed, is as follows:

Stock.....\$15,000,000.00

Less owned by company.....8,400,000

Stock outstanding.....\$14,991,600.00

Funded debt.....7,295,000.00

Bills, accounts and balances payable.....1,420,934.46

Income account, balance.....3,382,159.82

Total.....\$27,089,604.28

Road and equipment.....\$19,191,504.49

Cim. & Springfield, bonds and advances.....2,949,160.01

Ind. & St. L., stock, bonds, notes and advances.....3,808,473.64

Other Investments, stocks, etc.....173,528.10

Materials.....232,304.57

Accounts and balances receivable.....503,934.20

Cash.....230,789.27

\$27,089,604.28

The funded debt consists of \$25,000 Cleveland, Columbus & Cincinnati bonds; \$347,000 Bellefontaine & Indiana

bonds; \$3,000,000 sinking fund bonds and \$3,923,000 first consolidated bonds.

The earnings for the year were as follows:

	1883.	1882.	Inc. or Dec.	P.c.
Freight	\$3,684,717	\$3,159,417	D. \$90,700	2.6
Passengers	965,693	1,000,270	D. 34,577	3.5
Mail and express	178,696	178,789	I. 93	0.1
Rents, etc.	129,498	103,125	I. 26,373	25.6
Total	\$4,342,604	\$4,441,601	D. 98,997	2.2
Expenses	3,013,363	2,963,779	I. 54,604	1.8
Net earnings	\$1,324,221	\$1,477,822	D. \$153,601	10.4
Gross earn. per mile	11.106	11.360	D. 254	2.2
Net earn. per mile	3.388	3.780	D. 392	10.4
Per cent. of exps.	69.50	68.73	I. 2.77

The decrease in earnings was somewhat less than that in traffic, the loss in business being partly made up by the general improvement in the rates received.

The income account and statement of receipts and expenditures are as follows, condensed:

Net earnings, as above \$1,324,221.26

Premium on securities sold 165,530.70

Total \$1,489,751.96

Interest \$534,342.25

Taxes 125,144.32

O/d accounts 105.00

Dividend, 2 per cent., Feb. 1, 1883 299,984.00

959,576.57

Balance \$530,175.39

Cash on hand, Jan. 1 206,898.24

Bonds sold 988,000.00

Increase of bills payable 345,000.00

Sundry accounts 3,295.10

Increase in accounts receivable 28,100.01

Total \$2,101,468.74

Cash on hand Dec. 31 \$230,789.27

The Mt. Gilead Short Line earned \$4,088 and its expenses were \$4,965, leaving a deficit of \$882 for the year. No statements are given of the earnings of the other leased lines.

The traffic for the year was as follows:

1883. 1882. Inc. or Dec. P.c.

Passenger 1,106,726 1,035,819 I. 70,827 6.8

Freight 1,873,212 2,185,172 D. 311,960 14.3

Service and switch 1,422,864 1,172,800 I. 249,974 21.3

Total train miles 4,402,802 4,393,961 I. 8,841 0.2

Passenger miles 976,468 1,035,764 D. 59,296 5.7

Passenger-miles 43,548,617 44,759,982 D. 1,211,365 2.7

Tons freight carried 2,527,993 2,755,867 D. 227,874 8.3

Ton-miles 408,436,350 447,411,484 D. 38,975,134 8.7

Ave. train load:

Passenger, No. 39 43 D. 4 0.3

Freight, tons. 218 205 I. 13 6.3

Locomotive service cost 16.23 cents per mile run, against 17.43 cents in 1882. The decrease in freight train mileage was partly due to loss in traffic, but partly also to the continued use of heavier locomotives, replacing the light engines formerly used.

The average receipt and cost per unit of traffic were as follows, in cents:

Per passenger-mile: 1883. 1882. Inc. or Dec. P.c.

Receipt 2.217 2.235 D. 0.018 0.8

Cost 1.810 1.491 I. 0.328 22.0

Net receipt 0.398 0.744 D. 0.340 46.5

Per ton-mile:

Receipt 0.751 0.700 I. 0.045 6.4

Cost 0.545 0.513 I. 0.032 6.2

Net receipt 0.206 0.193 I. 0.013 6.7

On the Indianapolis & St. Louis road trains ran 2,743,534 miles, at a cost of 15.25 cents per mile for motive power. No other statements are given for the traffic of the leased lines which form so important a part of the system.

The division of freight traffic and the rates per ton-mile, in cents, were as follows:

	Through.		Local.	
	Ton-miles.	Rate.	Ton-miles.	Rate.
East-bound	210,831,817	1.622	49,239,462	1.122
West-bound	102,501,620	0.713	45,843,451	1.328
Total	313,333,437	0.652	95,102,913	1.079

The through rate showed an increase last year of 0.061 cent, or 10.3 per cent., and the local rate a decrease of 0.097 cent, or 9.0 per cent. The average haul on through freight was 190.8 miles; on local, 107.9 miles.

The average receipt and cost per ton-mile, in cents, have been as follows for 10 years past:

	Rec pt.	Cost.	Net.	Rec pt.	Cost.	Net.	
1883.	0.751	0.545	0.206	1878.	0.752	0.655	0.097
1882.	0.706	0.513	0.193	1877.	0.890	0.849	0.041
1881.	0.671	0.511	0.160	1876.	0.814	0.736	0.058
1880.	0.792	0.590	0.202	1875.	1.005	0.887	0.118
1879.	0.697	0.575	0.125	1874.	1.192	1.051	0.141

This includes all freight, through and local, in both directions.

The loss in traffic is attributed to a partial failure of local crops and to the cutting of through rates by competing lines in the latter months of the year.

President Devereux's report says: "The last annual report set forth the acquirement on the part of this company of the entire interest in the Indianapolis & St. Louis Railway and of its leased line, the St. Louis, Alton & Terre Haute Railroad,

"On June 6 last the stockholders of the Cleveland, Columbus, Cincinnati & Indianapolis Co. ratified the modified lease, duly executed by the Indianapolis & St. Louis Co. as lessee and the St. Louis, Alton & Terre Haute Co. as lessor.

"With the determined policy of this company to absolutely control and operate, as a single interest, this road with the other roads in question between Cleveland and St. Louis, including in such management the lines to Cincinnati, there followed the necessity of putting into good and efficient physical condition the St. Louis, Alton & Terre Haute Railroad and also completing the rebuilding and restoration of the line between Terre Haute and Indianapolis.

"It was determined that this reconstruction work, great as it was, should be vigorously pushed to completion, having regard to the best interests of all the properties, and to this cause the extraordinary expenditures of the past year are due.

"It may be said that at the St. Louis, Alton & Terre Haute Railroad has been largely renewed in its track and bridge superstructure, and extensive additions have been made to its sidings and buildings.

"Much of the work done, as well as that upon the line of the Indianapolis & St. Louis Railway, is comparatively permanent, and the future requirements of this character of expenditures will be limited.

"The outlay was necessitated not only to obtain safety and efficiency in the current working of these roads between

Indianapolis and St. Louis and to secure economical results in their cost of operating, but, with the possession of increased facilities and capacity, to be enabled to command an augmented traffic, the practical effect of which should make the Indianapolis & St. Louis, with its leased road, not only self-sustaining in themselves, but profitable in their respective outcome.

"There has been advanced during the year to the Indianapolis & St. Louis Railway and to the Receiver of the Indianapolis & St. Louis Railroad to provide for the outlays just described in carrying forward the plan of this company a total sum of \$1,109,79.

"There has been advanced to the Cincinnati & Springfield Railway during the year, as follows: For additions to property, \$88,281; for deficit in operating, \$174,948; total, \$263,229.

"The above charge on account of property addition is the third and final payment under original contract for station ground in the city of Cincinnati. No further obligation of this character attends the Cincinnati & Springfield Railroad, which has now been mainly relaid with standard pattern steel rails (heavier than the original rails), and whose original wooden bridges have now been entirely replaced with ample iron structures, while the road's capacity for service has been largely increased. * * *

"The bonded debt of the company has been increased \$93,000 during the year, and now stands at \$7,295,000. The reason for such increase is shown as follows:

"In providing for the outlays attending the reorganization of the Indianapolis & St. Louis Railroad, and the renewal and reconstruction expenditures connected with the lines between Indianapolis and St. Louis, it was the decision of your board not to attempt to dispose of bonds or other form of obligation based upon the credit of the Indianapolis & St. Louis Co., but to assume directly on the part of the Cleveland, Columbus, Cincinnati & Indianapolis Co., the carriage of these particular charges. Hence, during the year, sale was made of 998 of the consolidated mortgage bonds, and the current earnings of the main line were also used in part on account of the extraordinary expenditures just alluded to.

"The further action of your board has been to order the preparation of a new general mortgage of the Cleveland, Columbus, Cincinnati & Indianapolis Railway, in amount \$12,000,000, to include and ultimately retire all the standing mortgages, and thus yielding about \$4,500,000 bonds, as a provision for the present and future requirements of the railway in its development and additions to its estate.

"The mortgage has been completed, and a very limited portion of the bonds secured by it will now be offered for sale, with a view to partly recoup the treasury."

Mexican Central.

The following statements for the year ending Dec. 31 were submitted to the stockholders at the annual meeting in Boston this week.

The general account, condensed, is as follows:

	1883.	1882.	Inc. or Dec.	P.c.
Passengers carried	250,694	242,159	I. 17,535	7.2
Passenger-miles	9,552,770	8,559,872	I. 992,898	11.6
Tons freight carried	396,260	358,540	I. 37,720	10.5
Ton-miles	34,747,903	27,543,115	I. 7,204,878	16.2
Avrage receipt:				
Per passenger-mile	3.24 cts	3.22 cts.	I. 0.02 ct.	0.6
Per ton-mile	2.02 "	2.15 "	I. 0.13 "	6.0

The average passenger journey last year was 36.8 miles; the average freight haul was 87.7 miles. Both of these showed a considerable increase.

The earnings for the year were as follows:

	1883.	1882.	Inc. or Dec.	P.c.
Passengers carried	250,694	242,159	I. 17,535	7.2
Passenger-miles	9,552,770	8,559,872	I. 992,898	11.6
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Ton-miles	34,747,903	27,543,115	I. 7,204,878	16.2

The average passenger journey last year was 36.8 miles; the average freight haul was 87.7 miles. Both of these showed a considerable increase.

The earnings for the year were as follows:

	1883.	1882.	Inc. or Dec.	P.c.
Freight	\$696,618	\$591,364	I. \$103,254	17.4
Passengers	304,975	275,624	I. 34,351	12.5
Mail, etc.	52,070	37,330	I. 14,740	39.5
Total	\$1,058,663	\$906,318	I. \$152,345	16.8
Expenses	670,525	578,044	I. 92,481	16.0

Net earnings \$388,138 \$328,274 I. \$59,864 18.3

Gross earn. per mile 2.065 3.021 D. 5.8

Net 1,087 1,044 D. 7 0.6

Per cent. of exps. 64.34 63.78 I. 0.56

The earnings show a fair increase, as the new mileage is expected to have only a light business, being through an unsettled country.

The income account for the year was as follows:

Net earnings, as above \$388,138

Miscellaneous receipts 4,942

Total \$393,080

Interest 282,849

Surplus for the year \$110,231

Interest paid includes interest on the income bonds for the year.

During the current year the main line is to be completed to Lake Superior, and several branches built in the Agogebic iron district.

Kentucky Central.



Published Every Friday.

EDITORIAL ANNOUNCEMENTS.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN OPINIONS, and those only, and in our news columns present ONLY SUCH MATTER AS WE CONSIDER INTERESTING AND IMPORTANT TO OUR READERS. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

TRAVEL, CLASSES AND FARES IN PRUSSIA AND AMERICA.

The report of the Prussian state railroads for the year ending with April, 1883, covers an average of 9,001 miles of railroad—the largest system ever worked under one general management. The passenger traffic of this system amounted to 2,197,317,000 carried one mile, which is just about five times the passenger traffic on the 1,000 miles of the New York Central last year. We select for comparison the roads with exceptionally heavy passenger traffic in this country with nearly equal aggregate mileage, namely: the Eastern, the Boston & Maine, the Boston & Albany, the New York, New Haven & Hartford, the Old Colony, the New York Central, the Erie, the Pennsylvania (all east of Pittsburgh and Erie), the Central of New Jersey, the Philadelphia, Wilmington & Baltimore, the Fort Wayne, the Lake Shore and the Michigan Central, and find that in the aggregate they worked in 1882 9,140 miles of road, and carried 2,501 million passengers one mile. The density of passenger traffic in the Prussian state railroads was equivalent to 334 passengers carried each way daily over the whole system; on the selected American railroads it was equivalent to 386 carried each way daily. The Pennsylvania system east of Pittsburgh and Erie had very nearly the same density of passenger traffic as the Prussian state system (341 against 334 each way daily), the Erie about a tenth less, the New York, New Haven & Hartford 3½ times as much; the Fort Wayne a fourth more; the Lake Shore 30 per cent, and the Michigan Central 40 per cent, less. We thus have to select our roads of heaviest travel to find a passenger traffic equal to the average of the whole Prussian state system, which is very much greater than the average for the whole United States, which by the census of 1880 was reported equal to 98 passengers each way daily over the 86,781 miles in operation at that time. The Prussian state system had thus 3½ times the density of passenger traffic of our roads. It may be said that our passenger traffic has increased largely since the census year. It has, but not nearly in proportion to the increase of railroads. The density of passenger traffic on the 120,000 miles of railroad now in operation in this country is not so great by an important amount as was the density on the 86,781 miles which the census found in 1880. If it were, the traffic of the country must have increased nearly 40 per cent. in about three years. In that time the population has increased about 12 per cent., the area under cultivation about 8 per cent., many manufacturing and some mining industries at a vastly greater rate, but certainly, altogether, not enough to make an increase of 40 per cent. in traffic, especially not in passenger traffic, to do which each inhabitant would have to travel one-fourth more than in 1880, when business was prosperous and passenger traffic good.

The Prussian state railroads report their passenger mileage and earnings for each class of passengers sep-

arately, which enables us to compute the proportion of travel by each class, and the average fare for each class.

These were:

	P. c. of total traffic.	P. c. of total earn.	Av. fare per mile.
First class.....	2.62	6.43	3.298 cts.
Second class.....	18.13	29.86	2.210 "
Third class.....	41.30	41.44	1.370 "
Fourth class.....	32.14	19.78	0.822 "
Soldiers.....	5.81	2.49	0.580 "
Total.....	100.00	100.00	1.345 cts

The last census showed an average fare per mile on all United States railroads of 2.88 cents, or 5 per cent. more than the average second-class fare on the Prussian state railroads. The second-class is very comfortable there, doubtless as much so as the first-class cars on some of our roads, but not on many of our roads that have a heavy traffic. Probably on the average our service is considerably above the Prussian second-class service; it would be far above it but for our emigrant trains, which will rank above Prussian third-class, but much below the second-class. The first-class Prussian fare is much higher than the average on roads in any part of this country which approximates Prussia in density of population, but can be matched, probably, on some New England local lines, and on many Southern and Western roads.

The two higher classes in Prussia together carry only about one-fifth of the travel. The other four-fifths goes by the two lower classes, in which must be counted the soldiers, who travel at reduced rates, according to rank and service, in different classes of cars; but the overwhelming majority in the two lower classes.

It seems that the average rate for all passengers is nearly the same as the third-class rate, and 42½ per cent. less than the average rate for all classes in the United States in 1880. The nearest approach to this average Prussian rate in this country of which we have record is 1.80 cents on the New York, New Haven & Hartford in 1881, 1.80 on the New York Central in 1882, 1.81 on the Boston & Providence in 1880, and 1.71 on the Fitchburg in 1882. Many of these very low rates are because of a very large suburban travel carried on commutation tickets, and a very short road with not much other travel makes the best showing accordingly.

As this becomes more a manufacturing country there will be a greater demand for some kind of transportation at very low rates, and the railroads in some parts of the country may be driven in spite of themselves to establish a regular second-class car service on some of their trains. It would probably be cheaper for the railroads to carry the second-class passengers in first-class cars, to avoid the complexity and the necessity of hauling cars with a large proportion of the seats empty. But this cannot be done if the second-class traffic assumes considerable proportions and is carried in many trains at convenient hours. But the reason for adopting a less costly car for second-class passengers is not because of the saving, which cannot be important, but to prevent the destruction of the first-class travel. On the New York Central last year the whole cost of maintaining passenger and baggage cars was less than 0.17 per cent. per passenger-mile—about 75 cents for a journey to New York to Buffalo. The interest on the cost of the stock of passenger and baggage cars even at 8 per cent. was less than 0.08 cent per passenger mile, or 18 cents for a journey to New York to Buffalo. Even if the whole of this could be saved by using cheaper cars, it would make a difference of but 0.20 cent per passenger-mile. Not one half of it probably could be saved, though there might be a considerable economy in other expenses if the second-class cars could be made lighter, so that more passengers could be carried in the same train—an economy which would be great if there was enough of this traffic to crowd ordinary trains, but otherwise not important.

Not that a saving of one-fifth or one-tenth of a cent per passenger-mile is not worth striving for, but that it is but a small part of the difference between first and second-class fares if there is to be a heavy second-class traffic. In Germany the third-class is three-eighths lower than the second-class, and a difference of probably one-third would be required here to create any considerable addition to the travel, without which the second-class would be an unmitigated nuisance to the railroads. If anything of the kind is attempted it should be distinctly understood that the object is to develop a travel by rates which yield less than the average profit, just as sugar is carried for 30 cents while dry goods are charged 75 cents per 100 lbs. from New York to Chicago.

There is doubtless nothing like the need of a low-class, low-rate service in this country now that there is in European countries, and will not be so long as wages are on a much higher level in this country. But there is already in some parts of this country a

large operative population whose earnings but slightly exceed their necessary expenditures, and these would certainly travel a great deal more than they do if the cost was materially less. There is also a large class not poor who would make many journeys which they do not now make at all if the expense was greatly reduced. This latter class, however, including the great bulk of farmers' families, perhaps would revolt against traveling second-class. Just where a second-class travel large enough to pay could be developed it would be exceedingly hard to tell without trying, and as it costs something to try the experiment, this is probably the reason why it has not been tried. We suspect, however, that one of these days some courageous manager of a line in a thickly populated district will establish a regular second-class service at low rates, and that it will have something like the effect of Mr. Allport's putting third-class carriages on express trains in England, causing a radical change in the passenger traffic of many roads. But there are so many unknown quantities in the problem that it is very dangerous to estimate the effect in advance of a trial.

"The time will come when I shall look back with great interest to the ride that is now before me," said the young engineer, Horatio Allen, as he stood with his hand on the throttle valve of the "Stourbridge Lion," in 1829, about to begin alone the first ride ever made on a locomotive in America, the story of which he tells in our columns this week. But much as he may have hoped and expected from the invention which he was helping to introduce, and whose practicability he was then about to demonstrate for the first time on this continent, he could hardly have been so madly sanguine as to anticipate the transformations which it has caused and which his own eyes have seen. In 1829 there was barely a fringe of population along the sea coast of the United States, with out-posts, as it were, on the navigable waters of the Ohio and the Mississippi. In the whole United States there were but 12½ millions of people; now there are 56 millions. Then but 3 millions were in other than seaboard states; now there are more than 25 millions in the inland states. Pennsylvania, when he first guided the locomotive into one of her forests, had less than 1,350,000 people; now more than 4,500,000. The vast territory beyond the Mississippi, and much this side of it, was almost unknown as well as unoccupied. The vast resources of the interior, except on the lakes and navigable rivers, were a treasure fast locked by vast trackless distances. The key to this treasure was brought by the young engineer. He had good reason to be proud of his errand, and his reflections when, fifty years later, he revisited the spot and in the early morning took the solitary walk he tells us of, where before he took that solitary ride in the Pennsylvania woods, may well have stirred his heart.

The subject of curve resistance and compensation therefor was discussed quite extensively at the last meeting of the American Society of Civil Engineers, and a brief report of the discussion is given in another column; a noticeable fact in which was the absence of direct and exact experimental evidence on the subject. One test of great interest was contributed by Mr. Kingman, that a long train moving very slowly and yet without difficulty on a heavy grade, with both a front and rear engine (so that any loss from obliquity of traction, if it existed, would have been largely neutralized), was hopelessly stalled on a long 10° curve compensated at the rate of 0.05 per degree of curvature, equivalent to a resistance of 1 lb. per ton per degree.

Whether any such loss of energy from obliquity of traction does actually exist is very doubtful, and it may be well to note here a common error of theory which appeared in the discussion at the meeting, and often appears elsewhere.

The fact that there is what mathematicians call a "lateral resultant," or force tending to drag the cars sidewise toward the inner rail at every link, when they are being dragged round a curve, is undoubtedly. That this decreases the intensity of the longitudinal stress or pull at each link is also undoubtedly. But these facts do not prove the case, as is often taken for granted. We have to prove, in addition, how and where this side force produces additional friction and so consumes the energy developed by the locomotive. Let us imagine, for instance, a man standing at the centre of the curve, with a long rope attached to some link—or a man and a rope for every link—and pulling with all his, or their, force. Is it certain that this pulling would even tend to produce any effect, or that, if so, the effect tends to be injurious? On the contrary it is probable that the effect, if any, is favorable, for this reason: It is tolerably well known that fast and slow trains alike grind hard against the outside rail, being driven

there not by centrifugal force, which is a mere trifle in comparison, but by the resistance of the truck to moving on a curve instead of a straight line. The outside flanges do this work of continuously sliding the wheels on the rail, and produce in doing so the well-known flange wear on the inside of the outer rail which is seen on all curves, no matter how slow may be the speed of trains passing over them. A force of any kind, therefore, tending to draw the truck toward the centre of a curve probably has a beneficial effect, if any, although it is not certain that it has any, unless it be sufficient actually to drag the flanges sidewise against the rails and dress them there so as to produce friction.

The fact instanced by Mr. Kingman is of interest as tending to show that, at very low velocities, curve resistance is over 1 lb. per ton. It cannot be considered as proving that fact, nor can any one or two or three such reports; but in view of the fact that at ordinary working speeds it is quite well determined that curve resistance is about $\frac{1}{4}$ lb. per ton or even less, such facts (and we have heard of others similar) have a strong tendency to confirm experiments adduced by another member indicating that curve resistance, like other friction, is materially affected by velocity. This corresponds with the now admitted laws of friction in general, which show that the effect of varying velocity is especially great at the slower speeds. All sliding of wheel on rail, which produces curve resistance, takes place at very minute velocities even at the highest speeds.

Another fact brought out in this discussion and to be noted is: Upon how slim a basis of experimental proof the common assumption rests, that curve resistance increases *faster* than the degree of curvature; so that, for example, it is more than twice as great on a 10 or 20 degree as on a 5 or 10 degree curve. Such direct evidence as exists seems rather to point the other way; notably, the observed resistance on the 63 degree curves (90 ft. radius) of the New York Elevated Railroad, of only 14 to 16 lbs. per ton, or about $\frac{1}{2}$ lb. per degree, and the ease with which certain very sharp curves are operated on certain railroads. These indications are not decisive, but they leave abundant room for doubt.

The radical mistake in the narrow-gauge theory is again illustrated by the report made public last week on the Toledo, Cincinnati & St. Louis Railroad, the longest narrow-gauge line which has ever been attempted, or at least carried through, east of the Mississippi River.

The two experts selected to report on the road by the bondholders say that it is absolutely necessary to change the gauge in order to give the line any chance of success. The estimated cost of putting the line in fair condition as a narrow-gauge road is (as an average of the two estimates, which differ about \$900,000 from each other) some \$2,000,000, or \$4,400 per mile. To put the line in equal condition on a standard gauge basis, including all the inevitable losses of a change from one gauge to another, the estimate is about \$3,250,000, or \$7,200 per mile, a difference of about \$2,800 per mile, or perhaps 10 per cent. of the lowest possible cost of such a line, including terminal facilities and equipments. From this it will be evident that, had the line been constructed of standard gauge in the beginning, the cost would not have been increased more than 2 or 3 per cent. over that of a narrow-gauge line of equal excellence and solidity. We do not propose to reopen a theoretical discussion on the subject, since it is rapidly ceasing to be a living question, but the whole history of this road is an evidence of what we have always claimed was the only "merit" of the narrow-gauge; that in some cases it makes it easier to "raise the wind" for a project by imposing with its plausible fallacies on those with money to invest. Of course we do not question but that many of the projectors of such roads have been themselves imposed upon by the same fallacies and have acted in good faith; but the deciding argument in a great many cases, especially when the capital was sought in the country on the line of the road, among people not likely to be well advised in such matters, doubtless has been that the narrow-gauge was "a good enough Morgan till after the election."

The essential fallacy of the whole narrow-gauge theory is also evident in this, which cannot be successfully denied : If any line could furnish an excuse for choosing a narrow-gauge it was the Denver & Rio Grande, with its difficult country to traverse and its comparative isolation. Yet, now that the Denver & Rio Grande is complete, there is nothing whatever to prevent its throwing out its present rails, on its present ties, to standard gauge, retaining the same alignment and road-bed, and working its lines with identically

similar locomotives, of equal weight and cost per ton, and with not only equal but greater smoothness, safety, and economy. A little longer ties would be better, but they are no more essential for the standard gauge than for the narrow.

And the experience of this road shows the disadvantage of exceptional gauge even on what is an almost isolated system, with but two points of connection to the east and one to the west. Already the oldest part of the line, from Denver to Pueblo, has had third rails laid for a standard-gauge track, that it might be utilized by one eastern connection, and now that a connection has been made with the Central Pacific on the west it would be of very great advantage could the transcontinental traffic be carried in through cars from Chicago to Ogden.

At this date we have reports of earnings in March from 27 railroads, 16 of which show an increase over last year in total earnings, but the sum of the decreases is greater than that of the increases, and in the aggregate the result is:

	1884.	1883.	Inc or Dec.	P.c.
Miles.....	23,924	21,074	+ 2,850	13.5
Earnings.....	\$9,408,814	\$9,521,904	-\$113,090	1.2
Earnings per mile.....	393	452	- 59	13.0

This is a large decrease in earnings per mile, but the railroads generally had exceptionally large earnings in March last year.

Of the whole large gain of 2,850 miles in length of road reporting no less than 1,797 miles was by the two new extreme northwesterly roads, the Canadian Pacific and Northern Pacific, whose circumstances are manifestly exceptional. In spite of its increase of 80 per cent. in mileage the Canadian Pacific suffered a decrease in earnings, which were only \$187 per mile, and but \$50,000 more than in February. The period of its hibernation evidently was not over until after March. The Northern Pacific, however, earned \$383,900 (74 per cent.) more in March than in February, and 57 per cent. more than last year, its earnings per mile being \$368 against \$337 last year. The St. Paul & Duluth has a large decrease from last year, but still earned more than in 1882; and generally the roads northwest of Chicago show a considerable decrease from last year, but an increase over 1882.

The following statement for March for four successive years will give some indication of the course of their earnings, which is greatly complicated by their increase in mileage, which in many cases has been enormous :

	1881.	1882.	1883.	1884.
St. Paul & Duluth.....	\$63,535	\$85,588	\$69,511	
	324	407	306	
Chi., Mil & St. P....	\$916,089	1,561,386	2,043,730	1,789,000
	241	370	451	396
Chi. & Northwestern.	1,178,795	1,672,631	2,095,200	1,758,300
	421	524	580	491
Chi., St. P., Min. & Om.	251,649	413,200	441,400	451,700
	265	405	377	355
Mil., Lake Shore & W.	33,996	75,268	79,086	100,710
	136	271	243	269

March in 1881 was one of the worst months for snow blockades in the history of the country, and earnings were exceptionally small then, and they were exceptionally large last year. The earnings per mile of all the above roads were not only smaller this year than last, but less also than in 1882, though the total earnings of all were greater this year than in 1882. In the aggregate these roads earned \$4,168,911 this year against \$4,745,004 last year and \$3,786,320 in 1882, while their mileage for the three years successively has been 8,981, 9,806 and 10,501. Thus with an increase of 1,570 miles of road since 1882 there has been an increase of \$382,591 in the earnings, and the average earnings per mile have decreased from \$424 to \$397—not a very important change. The large decrease of \$576,093 from last year in spite of an increase of 695 miles in road is much less significant than it would have been had not the earnings been extraordinarily large last year. Still the earnings are decidedly lighter this year, averaging but \$397 per mile, against \$484 last year and \$424 in 1882; and it was not a month particularly unfavorable to traffic.

The Chicago & Alton, which rarely makes great gains, but almost always makes some even when most others lose, had a slight increase last March; the Chicago & Eastern Illinois has the large decrease of 19 per cent., having made but a slight increase last year. There are also important decreases on two Michigan roads that report, the Chicago & Lake Michigan and the Detroit, Lansing & Northern. The gain of 18 per cent. on the St. Louis & San Francisco reflects the good business of Kansas and Missouri; the decreases on the two small Arkansas roads, the light cotton crop last year. The Southern roads make a much better showing than was to be expected in view of the light cotton crop, which had been mostly marketed before March. The Mobile & Ohio, the Louisville & Nashville, the Memphis & Charleston, the Shenandoah Valley and the Western

North Carolina all make gains, which are generally but small, while the Richmond & Danville alone shows a loss, and that is very small. All these roads made gains last year also, and some of them very large ones, and generally their earnings this year are the largest they ever made in March. No Eastern road reports except the Long Island, which shows a slight increase.

It was charged before the east-bound rates were reduced that the rates were cut chiefly at St. Louis and Peoria, and that they were so well maintained at Chicago as to limit the shipments thence. If there could not be shipments *from* a place there would not be many shipments to it; and we know that the receipts of Chicago remained important through the winter. But while they were 53.7 per cent. of the aggregate receipts of the eight Northwestern markets in January, and 51½ per cent. in the first three weeks of February, they fell to 42½ per cent. in the last week of February, to 38½ in the first week, 40½ in the second week, and to 40 per cent. in the third week of March. In the last week, under the 15-cent rate, they rose to 49½ per cent. Thus the reduced rate seems to have been of advantage to Chicago. And simultaneously receipts at St. Louis and Peoria decreased, which is further evidence that the rates before the reduction were unequal and favored St. Louis and Peoria. The course of the receipts is shown below from Chicago, Peoria and St. Louis for periods before the reported discrimination in favor of St. Louis, during it, and since the reduction to 15 cents has put all places on a level again. The figures for January are the average *weekly* receipts in that month:

	Bushels.			P. c. of Total		
	Chicago.	Peoria.	St. Louis.	Chicago.	Peoria.	St. Louis.
January.	9,343,365	431,063	610,589	53.7	9.9	14.0
3 weeks of						
Feb.	2,267,193	541,113	739,515	51.2	12.3	16.7
Week to						
March	2,163,490	706,240	623,214	42.9	14.0	24.8
"	8,131,163	605,596	538,597	38.5	13.3	29.4
"	15,1,999,25	505,265	435,497	40.8	10.3	29.3
"	22,1,793,369	454,228	1,359,641	49.0	10.1	30.3
"	29,3,065,017	537,815	978,288	49.5	8.6	23.2

Not improbably there was more cutting at Chicago than further south in January, for its percentage then was exceptionally large for a winter month. In the first three weeks of February St. Louis and Peoria together increased their percentage 5.1 to 29, only 2.5 of which came from Chicago, but in the next four weeks their percentage increased from 38.8 to 42.7 per cent. of all the whole, while Chicago's share decreased just about as much. But in the week ending March 29 Chicago goes up and St. Louis and Peoria down. Compared with the previous week there was an increase of 272,000 bushels at Chicago and a decrease of 478,000 at the other two towns. These, it must be remembered, are the receipts and not the shipments of these markets, which receipts in the aggregate have decreased and not increased.

The great decrease in the price of wheat took place so long ago that it should have had some effect on the exports in the last week of March; but it seems to have had very little. For five successive weeks the exports from Atlantic ports have been:

	Week ending				
	March 1.	March 8.	March 15.	March 22.	March 29
Flour, bbis.	96,782	108,873	148,068	131,051	116,748
Grain, bu.	1,206,118	1,412,281	1,561,846	1,150,945	1,528,901

It can hardly be said that any effect is visible here. Nor does a comparison with previous weeks in February and January make a more favorable showing.

The Chicago, Burlington & Quincy Company offers to its stockholders a new issue of stock amounting to 10 per cent. of their present holdings, which will amount to nearly \$7,000,000. This issue is announced to be made "to pay for construction and equipment, and to build and aid in building branches already authorized." The privilege of subscribing at par for a stock as well tried as the Chicago, Burlington & Quincy is a valuable one, and the holders will certainly eagerly accept it; but even the soundest and most trustworthy management when it asks for additional capital ought to explain more definitely what it wants to do with it and what it expects to effect by it. Seven millions is a good deal of money. It would go far toward extending the Burlington to Ogden, and it would probably more than pay the cost of an extension to St. Paul, or it may be used for extending the second track or for more branches.

The new stock will not be issued until Jan. 1 next, and on the payments made meanwhile—10 per cent. May 31, 30 per cent. Aug. 20, Oct. 20—the company will pay 5 per cent. interest. The final payment of 30 per cent. will be due Dec. 30. In this way the company will not have to pay the high interest represented by dividends on the stock until what is constructed with the new capital is completed so far that it may add to the earnings.

This issue of stock may be regarded as committing

the company to considerable extension of its already great system; for it is not probable that any very large part of the seven millions will be required for improving the road and adding to its equipment.

The freight traffic of the Prussian state railroads in 1882-83, when an average length of 9,001 miles were worked, amounted to 5,437,678,000 ton-miles, which is equivalent to 828 tons carried each way daily over the whole mileage, which may be compared with the 3,015 tons each way daily on the New York Central last year, on the one hand, and the 510 tons of the whole United States railroad system, as shown by the Census of 1880. The Chicago & Alton, the Chicago & Eastern Illinois, and the Chicago, Rock Island & Pacific had but little less density of freight traffic in 1882 than the Prussian state system; the Lake Shore had 18 per cent. more, the Michigan Central 15 per cent., the Indianapolis & St. Louis 22 per cent., the New York, Pennsylvania & Ohio 100 per cent., the Pan-handle 243 per cent. and the Fort Wayne 250 per cent. more. (The two last-named are all main line.) Nearly one-half (454 per cent.) of the Prussian freight traffic was coal. The average length of haul was 48½ miles, and the average rate per ton per mile was 1.388 cents, which may be compared with the 1.29 cents which was the average of all the railroads in the United States by the last Census, and with the 0.91 cent of the New York Central, the 0.881 of the Pennsylvania lines east of Pittsburgh and Erie, the 0.78 of the Erie, and the 1.128 cents on the Chicago & Alton last year.

The Prussian report gives the receipts per ton per mile for freight of each class. The highest class which is properly express, forms less than ¼ per cent. of the whole, and pays an average rate of 8.23 cents per ton per mile (= \$4.07 cents per 100 lbs. from Chicago to New York). The freight shipped in small quantities—"piece" freight the Germans call it—formed a little more than 5 per cent. of the whole and paid 4.23 cents per ton per mile. The percentage of the total tonnage-mileage which each class of freight formed, and the average rate per ton per mile received for each class:

	Per cent.	Rate per ton-mile.
By Uniform Standard Rates:		
1. Fast and express freight	0.37	8,230 cts.
2. Package goods	5.12	4.230 "
3. Class A. I	1.94	2.539 "
4. Class B.	2.60	2.251 "
5. Class A. II	2.85	2.024 "
6. Special tariffs I.-III.	27.86	1.300 "
Exceptional Rates:		
1. Fast and express freight in car loads of at least 11,000 lbs.	0.25	3.008 "
2. Car loads of at least 22,000 lbs.	58.91	1.032 "

Thus only about two-fifths of the freight was carried at the "uniform" rate, so-called, while more than 59 per cent. was carried at some special rate varying from the uniform standard basis.

The lowest of these rates is equivalent to 47 cents per 100 lbs. from New York to Chicago. These averages, however, include local as well as through traffic, of course. Nearly all the coal goes at the lowest rate, and if we subtract this we shall find that 75½ per cent. of the other freight went either under the special tariffs, I., II., III., at an average rate of 1.3 cents per ton per mile, or at an irregular rate averaging 1.032 cents per ton per mile.

Erie Earnings and Expenses for February and for Five Months.

The report of the New York, Lake Erie & Western for February, unlike most other railroad reports, shows a great improvement over January and December in the net results. Exclusive of the leased New York, Pennsylvania & Ohio there was in February a decrease of \$50,206 (4 per cent.) in gross earnings, but a decrease of no less than \$124,754 (12 per cent.) in working expenses, resulting in an increase of \$74,547 (32 per cent.) in net earnings. The earnings and expenses in February for seven successive years have been:

Year.	Gross earnings.	Expenses.	Net earnings.
1878.....	\$1,121,412	\$804,847	\$316,565
1879.....	1,207,391	934,976	273,315
1880.....	1,252,217	909,633	342,584
1881.....	1,425,765	1,059,160	366,605
1882.....	1,304,757	1,013,057	291,700
1883.....	1,283,616	1,049,816	233,800
1884.....	1,233,409	925,062	308,347

Thus the gross earnings were smaller this year than in any other since 1879, but the working expenses were also smaller than in any year since 1880. The net earnings thus were just about equal to the average for the seven years, and not only 32 per cent. more than last year, but also 5½ per cent. more than in 1882—both of which, however, were bad years.

The gross earnings of the New York, Pennsylvania & Ohio last February were \$388,506 and the working expenses \$333,111, leaving but \$55,395 of net earnings, while the 32 per cent. of the gross earnings paid as rental amounted to \$125,522, so that the lease resulted in a loss of \$70,127, and taking this from the net earnings of the Erie proper we have \$238,221 of profits left available for paying interest on bonds, etc., which is \$4,421 more than last year in February, but less than in any other February. In January

these profits amounted to only \$85,773, and for the ten months of the lease they have been:

May.....	\$631,055	October.....	\$843,368
June.....	615,722	November.....	703,079
July.....	616,773	December.....	226,343
August.....	1,100,065	January.....	85,773
September.....	1,037,413	February.....	238,321

The fluctuations, we see, have been very great. The gross and net earnings of the New York, Pennsylvania & Ohio in February for five previous years had been:

	1878.	1879.	1880.	1881.	1882.
Gross.....	\$255,879	\$294,713	\$384,982	\$398,268	\$399,885
Net.....	39,867	47,413	125,624	73,102	74,696

Thus the gross earnings this year were nearly as much as in 1881 and 1882, and more than in the previous years. The net earnings given above after 1879 were larger than this year, but under the lease a considerable amount is charged to working expenses which was not previously, and it is probable that with the expenses charged in the same way as this year the net earnings in the above years, except 1880, would be no larger than this year. It is, however, somewhat remarkable that the connection with the Chicago & Atlantic afforded no addition to gross earnings last February.

For the five months of the fiscal year ending with February the gross and net earnings and working expenses of the Erie (exclusive of the leased Ohio road) have been:

	1883-84.	1882-83.	Decrease, P.c.
Gross earnings.....	\$7,728,305	\$8,137,722	\$400,417 5.1
Expenses.....	5,472,900	5,757,072	284,172 4.9
Net: earnings.....	\$2,255,405	\$2,380,650	\$125,245 5.3

Taking the five months together there was but a slight decrease, but the changes in the separate months, except November, have been important.

For seven successive years the earnings and expenses for these five months ending with February have been:

Year.	Gross earnings.	Expenses.	Net earnings.
1877-78.....	\$6,996,849	\$4,661,893	\$2,334,956
1878-79.....	6,415,242	4,513,491	1,901,751
1879-80.....	7,176,375	4,860,287	2,316,088
1880-81.....	6,298,838	5,491,892	2,801,346
1881-82.....	7,725,297	5,004,172	2,121,125
1882-83.....	8,137,722	5,757,071	2,380,650
1883-84.....	7,728,305	5,472,900	2,255,405

Thus the gross earnings this year, though 5 per cent. less than last and 7 per cent. less than in 1880-81, were larger than in any other year, though nearly the same as in 1881-82. The working expenses were the smallest since 1879-80, and the net earnings were largely exceeded only in 1881, though somewhat last year and in 1880. These net earnings really have been curiously uniform.

For these five months the gross earnings of the leased New York, Pennsylvania & Ohio road were \$2,574,995, its working expenses \$1,909,618, and its net earnings \$655,377, while the rental paid by the Erie amounted to \$824,000, so that the lease resulted in a loss of \$158,833, the working expenses having been 74 per cent. of the earnings, while the Erie receives but 68 per cent. of them. The loss in these five months probably was less than the profit in a single month last summer.

Subtracting the loss on the lease from the net earnings of the Erie proper we have \$2,096,782 of the profits of the Erie available for its fixed charges and dividends, which is less than in any other year except in 1878-79, and \$283,868 less than last year.

For five years previous to 1883 the reported gross and net earnings of the leased Ohio road for the five months ending with February had been:

	1877-78.	1878-79.	1879-80.	1880-81.	1881-82.
Gross.....	\$1,664,494	\$1,617,104	\$2,087,716	\$2,294,402	\$2,218,433
Net.....	455,222	285,803	508,273	644,432	565,169

Thus the \$2,574,995 of gross earnings this year were materially more than ever before, and so were the \$655,377 of net earnings, notwithstanding the new method of charging expenses made them smaller than they would have been by the old method. But in none of the years above were the net earnings even as reported as much as 32 per cent. of the gross, so that in all of them there would have been a loss on a lease like that now in force, the fact being that these five months are not equal to the average of the year, though they cover two of the best months.

The quarterly report recently made by the New York, Lake Erie & Western to the New York Railroad Commission for the first three months of its fiscal year showed an excess of net earnings over prior charges amounting to about \$145,000. The net earnings then were \$1,772,789. This gives an average of about \$542,000 of charges per month payable out of net earnings before dividends can be paid. At that rate the \$324,094 of profits in January and February lacked \$760,000 of meeting the \$1,084,000 of charges, and allowing for the surplus of the first three months the net result of the first five months of the fiscal year is a deficit of \$615,000. There are, however, some sources of income besides the railroad earnings (which are given in arriving at the surplus for the first quarter, but not for January and February). This might seem a serious state of things; but this road has never earned its fixed charges in the winter months, and though the profits were unusually small in these three months this year (\$550,487, against \$980,114 last year and \$855,864 in 1882), in none of these years have they been equal to the proportion of fixed charges for these months.

And even for the five months, two of them being among the best of the year, the company's net earnings previous to this year, as well as this year, in every year but one have been less than the \$2,710,000 of the prior charges which now (approximately, accrue in these five months, and yet there has always been some surplus for the year. It must be remembered that the other seven months are always much more productive than the five now reported. The average monthly

net earnings for the first five and the last seven months of the fiscal year have been:

Year.	5 mos.	7 mos.	Year.	5 mos.	7 mos.
1877-78.....	\$447,000	\$396,000	1881-82.....	\$424,000	\$381,000
1878-79.....	380,000	410,000	1882-83.....	476,000	711,000
1879-80.....	463,000	676,000	1883-84.....	419,000
1880-81.....	560,000	665,000			

An average income of about \$631,000 per month from March to September inclusive is apparently all that is required to meet the fixed charges, including the apparent deficit of \$615,000 for the first five months of the year. This is considerably less than the profits from the railroad earnings have been in these months in any year since 1879, and 11 per cent. less than last year. The margin is, however, an unpleasantly close one.

Negotiations between the Union Pacific and the Chicago, Burlington & Quincy concerning the traffic for which they compete and the rates on it have been in progress now for some two months, and it has been rumored that the two companies have come to an agreement as to the east-bound shipments; while for the west-bound the Western Trunk Line Association's right to fix the rates over the Union Pacific prevents the latter from making an agreement; but the Association itself may do so.

Chicago through rail shipments eastward for the week ending March 29 for five successive years have been, by the complete report:

	1880.	1881.	1882.	1883.	1884.
Tons.....	87,690	45,758	34,335	57,094	80,800

Thus the shipments this year were larger than in any other except 1880 and were 23,706 tons (41½ per cent.) more than last year. The corresponding week of 1880 and the first week of the railroad war in 1881 (ending June 25) are the only ones in the history of the traffic when the shipments of the week this year have been exceeded, but they were very nearly equalized in the fourth week of January, 1882, when they amounted to 80,525 tons. At the current rates, however, the gross earnings from the shipments were but \$711 this year to every \$1,000 last, \$400 in 1882, \$800 in 1881 and \$1,792 in 1882—that is, in spite of the enormously greater shipments this year the earnings from them were much less than in any other except 1882—29 per cent. less than last year and 60 per cent. less than from the larger shipments in 1880.

The percentage of the shipments of the week carried this year and last by each road was:

	1884.	1883.	1884.	1883.
C. & Grand T.....	10.4	14.1	Ft. Wayne.....	17.8
Mich. Cen.....	10.2	23.7	C. S. L. & Pitts.....	7.2
Lake Shore.....	11.5	17.8	Balt. & Ohio.....	11.2
Nickel Plate.....	15.7	Ch. & Atlantic.....	4.1

Thus next to the Fort Wayne the two new roads were the largest carriers of the through shipments this year, and they and the Baltimore & Ohio alone exceeded their awarded proportions. The two old Vanderbilt roads carried but 21.7 per cent. of the whole, against 41.5 last year; and the Pennsylvania roads carried 25 per cent. this year, against 40.3 per cent. last. The Baltimore & Ohio and the Chicago & Atlantic were short, that is, under the apportionment the other roads owe them traffic—but so are the Pennsylvania roads. What the Vanderbilt roads and the Grand Trunk carried last winter in excess of their awarded proportions they now have to pay back at the rate of 30 cents per 100 lbs., though they probably got only from 25 to 20 cents for carrying the freight; and at present rates it is necessary for the roads that are short to carry an enormous excess tonnage to make good their shortage.

The grain shipments for the week reported must have amounted to about

equivalent to 8.4 cents per bushel of corn, which is about 17 per cent. of the Chicago price, but the difference of 30 cents which it makes per barrel of pork is only 2 per cent. of the price, and not more than common fluctuations in the price—certainly not enough to have an appreciable effect on the production or consumption.

The shipments (through and local) last week are the largest that have ever been reported. They were, however, but little more than the *through* shipments made in the week to March 27 in 1880, which were 87,690 tons, and the rate in 1880 was 35 cents, against 15 this year, while there were five railroads to carry the freight in 1880, against eight this year. The share of the five old roads in last week's shipments was about 67,100 tons, which is 20,000 tons less than they carried in 1880, and their gross earnings from the shipments were about \$1,000 this year to \$3,044 in 1880. As to net earnings, they can hardly be said to have existed this year.

The distribution of the shipments among the several roads last week (not the pool percentages) was as follows: Chicago and Grand Trunk, 11.1; Michigan Central, 9.8; Lake Shore, 12.5; Nickel Plate, 15.3; Fort Wayne, 13.6; Chicago, St. Louis & Pittsburgh, 11.1; Baltimore & Ohio, 8.3; Chicago & Atlantic, 18.2 per cent. Thus in this week of enormous shipments the new Chicago & Atlantic single-track road has a long lead, and the new Nickel Plate stands second; while the old Michigan Central, which in 1880 was awarded and carried 31 per cent. of the whole, stands next to the last on the list. The three newer roads carried 44.6 per cent. of the whole, amounting to 40,585 tons, which is nearly equal to the average aggregate through shipments in January and February. Judging by the relative capacity of the roads, if they were able to take 90,000 tons out of Chicago last week distributed as it was, they could, if each did its best and could get cars enough, carry as much as 165,000 tons out of Chicago in one week, which is more than three times the average shipments in any year heretofore. We may judge from this how idle it is to expect the rates for transportation to settle themselves by the relation of supply to demand.

The Chicago, Burlington & Quincy earnings in February show a great increase over January, which is not usually the case. For five successive years its gross earnings in January and February have been:

	1880.	1881.	1882.	1883.	1884.
Jan.	\$1,432,740	\$1,307,948	\$1,658,634	\$1,025,680	\$1,648,220
Feb.	1,411,870	1,034,821	1,457,301	1,611,021	1,971,013
2 mos.	\$2,844,610	\$2,342,769	\$3,116,135	\$3,236,701	\$3,619,233

Thus this year the earnings were \$323,000 more in February than in January, while in every other year they have always been the smaller in February. The increase in February over last year is \$360,000, or 22½ per cent., and for the two months there is an increase of 11½ per cent. The working expenses in February for five years have been:

	1880.	1881.	1882.	1883.	1884.
\$731,260	\$711,906	\$908,303	\$888,290	\$1,012,848	

The expenses were thus larger this year than in any other. The net earnings have been:

	1880.	1881.	1882.	1883.	1884.
\$630,601	\$322,825	\$612,908	\$722,722	\$958,165	

Thus the net earnings were \$235,443 (32½ per cent.) more this year than last, and still more than in any previous year—a remarkable improvement to make in these days.

It appears from this statement that the January earnings must have been greatly affected by some temporary cause. For the last seven months reported the company's gross earnings have been:

	August.....	\$2,495,122	December.....	\$2,170,918
September.....	2,909,165		January.....	1,648,220
October.....	2,732,479		March.....	1,971,013
November.....	2,502,753			

Thus the February earnings are about what was to be expected from the earnings previous to January. It is the January earnings that were abnormal.

It seems exceedingly difficult to ascertain the number of locomotives running with Joy's gear. It was asserted that a large number of engines on the Great Western Railway of England were so fitted, but Mr. Barnett, of the Grand Trunk, denied that statement. Only three or four appear to be running in this country, one having been built by the Baldwin Works for the Northern Pacific, and another by the Portland Locomotive Works for the same railroad. Two were at work on the Philadelphia & Reading, but the ordinary link motion has been substituted on one of these engines. Another engine was, we believe, running for some time on the Ohio & Mississippi Railroad.

We published last week a letter from Mr. Wayland Turner (Mr. Joy's agent in this country) in which he denies a statement made in these columns that several new engines building for the Great Eastern Railway (England) are fitted with ordinary link motion. Mr. Turner asserts that since the Joy gear was "exploited" on that line all new engines have been fitted with it. We can form no idea of the date of this "exploit," but the statement published a few weeks ago was based on information received from well-informed and disinterested sources, and we do not understand that Mr. Wayland Turner's contradiction is a quotation from a letter of Mr. Worsell, but is simply an inference drawn from the word placed in inverted commas in Mr. Turner's letter in our last issue.

The proof of a car is in the riding, to paraphrase an old saying, and a friend whose business leads him to travel much and over many roads tells us that, judged by this test, the new cars of the Boston & Albany are the best passenger cars he has ever seen. Not particularly showy—plain even in their finish as compared with many other new cars—they are in all respects the most thoroughly comforta-

ble cars now in use. This is largely due to the attention which the builders have paid to minor matters, or to what are usually considered such, although it is these which go chiefly to make up the comfort or discomfort of the passenger. The seats are of a form adapted to the human frame, the foot-rests are conveniently placed, the windows are large and well placed and open easily, and the decoration is unobtrusive, rather soothing by its absence of gaudiness and glaring colors. The cars ride easily and, above all, the ventilation is the best which has been yet attained. One can ride in these cars without being half-suffocated by bad air; the body is not fatigued by an effort to accommodate itself to a badly shaped seat, and the eye is not wearied by decorations which seem to thrust themselves upon one's attention.

Car-builders spend much time and thought in reducing the weight and increasing the strength of their framing, in improving the running gear and in costly interior decorations, but they are apt to forget that the expenditure of some care and a little money on other and apparently small matters may make all the difference between a car in which one may ride all day without sensible fatigue and a car which one leaves with most profound satisfaction, and the hope that it may find an early grave in the scrap heap.

Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows:

Kansas & Gulf Short Line.—Track laid from Tyler, Tex., southward 24 miles.

Nashville, Chattanooga & St. Louis.—The *McMinnville Branch* is extended from Rock Island, Tenn., northeast 8 miles.

Toledo, Ann Arbor & Northern Michigan.—Track laid from Owosso, Mich., northwest to Elsie, 14 miles.

Union Pacific.—The *Georgetown Branch* of the *Colorado Central Division* is extended from Georgetown, Col., to Silver Plume, 5 miles. Gauge, 3 ft.

This is a total of 51 miles of new railroad, making 437 miles reported to date for 1884. The total track reported laid to the corresponding date for 12 years is as follows:

	Miles.	Miles.
1884.....	437	1878.....
1883.....	852	1877.....
1882.....	1,545	1876.....
1881.....	778	1875.....
1880.....	964	1874.....
1879.....	326	1873.....

These statements include *main track only*, no account being taken of second tracks or other additional tracks or sidings.

Those who have followed the record will note that the larger part of the track laid so far this year has been in the South. This has been due largely to the severe and unfavorable weather in the North. It is also true that while the number of new projects noted has been large, there are very few on which work has been actually begun. The fact is that investors have plenty of money and are quite ready to lend it to companies of established credit, but money for new projects is very hard indeed to get.

NEW PUBLICATIONS.

Tables for Computing Equivalent Metric and Non-Metric Weights and Measures. By W. A. G. Emonts, C. E., Philadelphia. Wm. Syclemoore, 1883.

This little pamphlet gives values in metric units for from 1 to 9 inches, feet, quarts, etc., including nearly all English and American weights and measures, both simple and compound, based on the latest determination of the foot-value of the metre. It will have its convenience for those who have occasion to compute these values, since the method is at once concise and sufficiently full to save all multiplication, but the tables are printed on only one side of the page and fill unnecessary space. It would have been better and more useful to have condensed the same information on a card, or to occupy the same space and have extended the tables to 100 instead of 10; either of which might easily have been done.

The Semi-Centennial of the Pennsylvania Railroad.

BY J. E. WATKINS, C. E.

On the 15th of April fifty years ago the Governor of the state of Pennsylvania, the Canal Commissioners and members of the Legislature embarked on a canal boat from Harrisburg bound for Columbia to take part on the morrow in the formal opening of the railroad from Philadelphia to Columbia—the first link in the great chain of the present Pennsylvania system. That was the humble beginning of what has grown to be the giant corporation of the world, whose lines tap thirteen states—whose main tracks would extend from its eastern terminus, across the Atlantic, through Europe, to the boundary of the Chinese Empire; or westward across the continent, and the Pacific almost to Japan; whose second track, sidings, etc., alone would reach across the continent and over 1,000 miles into the Pacific—whose cars and engines made up in a single train would reach from the western boundary of Pennsylvania across New Jersey to the Atlantic Ocean; to replace the timber under whose main tracks and sidings (allowing three cross-ties to the stump) would consume a double row of trees ten feet apart on each side of the Missouri from its source down the Mississippi to the Gulf—whose employés if placed side by side would form a rank reaching from Philadelphia to Trenton, and the iron and steel contained in whose tracks, bridges and cars, etc., would make a shaft 6 in. in diameter and long enough to extend from pole to pole upon which the world could turn.

The proof of a car is in the riding, to paraphrase an old saying, and a friend whose business leads him to travel much and over many roads tells us that, judged by this test, the new cars of the Boston & Albany are the best passenger cars he has ever seen. Not particularly showy—plain even in their finish as compared with many other new cars—they are in all respects the most thoroughly comforta-

ble cars now in use. This is largely due to the attention which the builders have paid to minor matte's, or to what are usually considered such, although it is these which go chiefly to make up the comfort or discomfort of the passenger. The seats are of a form adapted to the human frame, the foot-rests are conveniently placed, the windows are large and well placed and open easily, and the decoration is unobtrusive, rather soothing by its absence of gaudiness and glaring colors. The cars ride easily and, above all, the ventilation is the best which has been yet attained. One can ride in these cars without being half-suffocated by bad air; the body is not fatigued by an effort to accommodate itself to a badly shaped seat, and the eye is not wearied by decorations which seem to thrust themselves upon one's attention.

It will be remembered that the Pennsylvania Railroad and Canal from Philadelphia to Pittsburgh was constructed and operated for about 25 years by the Commonwealth of Pennsylvania, remaining under the control of that state until 1857, when it was finally purchased by the present corporation.

The line from Philadelphia to Pittsburgh, as originally designed and constructed, was composed of 81.6 miles of railroad, from Philadelphia to Columbia; 172.0 miles of canal, Columbia to Holidaysburg; 36.7 miles of Portage Railroad from Holidaysburg to Johnstown; 104.2 miles canal from Johnstown to Pittsburgh; 39.5 miles, in all.

A general idea of the magnitude of the work may be gathered from the profile and the map herewith.

EARLY HISTORY.

The industries of the state of Pennsylvania, which had, in common with the other Eastern states, slumbered during the war of 1812-15, began to revive soon after peace was declared, and the importance of better means of communication between the interior of the state and the seaboard became apparent.

As early as 1808 New York had taken the initiative steps by which that commonwealth became the pioneer state of the Union in the construction of a great public work, the Legislature appointing a commission to consider the advisability of connecting the waters of the Hudson with those of Lake Erie.

At that time the railway for general purposes was an untried experiment in America, and in England only a few short colliery roads had been built. Nevertheless the possibilities of the future had already dawned upon at least one American citizen, namely, John Stevens, of Hoboken, who opposed the construction of the Erie Canal and advocated a railroad, and becoming involved in a discussion with the New York Commissioners, in 1812 published a pamphlet* containing his correspondence with them, in addition to a vigorous memorial which set forth "The advantages of a railway over canal communication."

(About five years afterward Mr. Stevens memorialized the Legislature of New Jersey, advocating the construction of a railroad from New Brunswick to Trenton.) While there were some who believed that a railroad was practicable the vast majority regarded it as a wild and visionary scheme. Among the latter were the New York Commissioners, and work on the Erie Canal was formally commenced on the 4th of July, 1817, and the canal being completed and opened over its entire length of 363 miles, October, 1825. About the same time work on the "Union Canal" of Pennsylvania, which had been abandoned for several years, was renewed, this canal being completed and opened for use in 1824 and that of the Lehigh Navigation Co. from Easton to Mauch Chunk shortly afterward.

Both of these canals did much to develop the trade in anthracite coal, which had been introduced only a short time before.

The advantages and disadvantages of a railroad had been discussed for some time by the press of Pennsylvania and in the Legislature at Harrisburg, but no decided step was taken until 1823, when the Pennsylvania Legislature passed "an Act to incorporate a company to erect a railroad from Philadelphia to Columbia in Lancaster County," (approved March 31, 1823), which recites that it was enacted in consequence of a memorial by John Stevens. This act constituted John Conolly, Michael Baker, Horace Binney, Stephen Girard, Samuel Humphreys, Emmor Bradley, Amos Ellmaker, John Barber and William Wright, "the President and directors of the Pennsylvania Railroad Company; it provided for the location of the route under certain restrictions; it must not be more than 40 ft. wide; must not pass through any burial ground nor church, nor through any house without the owner's consent, nor be located on any turnpike road; must in no part of it rise above an angle of 2 degrees with the plane of the horizon;" and it expressly directed that when it was completed transportation over it should be conducted under the superintendence of John Stevens. The company was authorized to charge 7 cents per ton per mile on freight carried westward, and 3½ cents on that carried eastward.

Although Messrs. Stevens, Girard, Binney, et al., had succeeded in getting their act passed they received no tangible encouragement either from the state or from capitalists, although earnest efforts were made in that direction.

John Stevens who, as early as Jan. 5, 1821, had written an open letter to Robert Wharton, Mayor of Philadelphia, in regard to the matter, was particularly zealous in his labors, but the citizens of Pennsylvania could not be aroused to the importance of the scheme. Their failure to encourage the undertaking led to the publication and distribution of a public letter by Mr. Stevens later, in 1823, which, considering the fact that no railroad for general purposes was in existence anywhere, is a fit supplement to the Stevens pamphlet of 1812, and entitles its author to be held in grateful remembrance by those for whose interests he labored so earnestly.

The following is a copy of it:

"PHILADELPHIA, 1823.

"SIR: It is now generally admitted that a railroad is not a mere visionary project, but is actually practicable. An erroneous idea has, however, prevailed among its opponents, that it is only practicable to short distances, and that the

* This pamphlet, originally published by T. & J. Swords, New York, has recently been reprinted by the *Railroad Gazette*.

contemplated extension of a railroad to a distance of 73 miles is ridiculous.

"As the railroad will, throughout its course, be, in its construction, exactly similar, it is only in its deviations from a horizontal line that any difference in the progressive motion of carriages thereon can take place. The charter contains a provision that the railroad in its progress shall in no part rise above an angle of two degrees with the plane of the horizon.

"Now let us suppose that a section of the intended railroad be constructed in the immediate vicinity of the city, of one mile in extent, in the progress of which elevations of two degrees do actually occur. Should it, however, be practicable, on such section of the intended railroad, to cause loaded carriages to move forward and backward, without encountering any impediment or difficulty, would it not be fairly presumable that the effect would be precisely the same were a similar road to be extended ever so far? Such an experiment, then, would not fail to produce conviction in the minds of the most incredulous.

"As a further illustration of the practicability of the proposed railroad, it would be barely necessary to notice the rapid progress this important improvement has recently made in the island of Great Britain. If, in the narrow limits of 21 miles in length and 12 miles in breadth, in the immediate vicinity of Newcastle, no less than 450 miles of railroad have, within a very short period of time, been formed, why should it not be practicable to erect one extending only 73 miles? The contemplated formation of a

transportation shall have been extended to Pittsburgh, and thence into the heart of the extensive and fertile state of Ohio, and also to the great Western lakes. Philadelphia may then become the grand emporium of the Western country.

"Should the subscription for the shares be speedily filled the road from Philadelphia to Columbia may with ease be finished before the next winter, and thus the stockholders will derive an immediate interest on their stock.

"I am, sir, your obedient servant,

"JOHN STEVENS."

No comment is needed upon this remarkable paper, which is a fitting supplement to the pamphlet issued 11 years before.

Colonel Stevens' efforts in this direction shared the same fate in Pennsylvania as in New York, and although he made diligent efforts to excite popular opinion in favor of his project during 1824 and 1825, he was unable to raise funds even to build one single mile of road as an experiment, although only \$5,000 were required. The Legislature of 1826 repealed the charter, although the seed then sown was to bring forth good fruit.

Had Colonel Stevens been able to carry out his plans the Pennsylvania Railroad would have been the pioneer railroad on this side of the Atlantic.

The success of canals abroad and of the Erie Canal, a por-

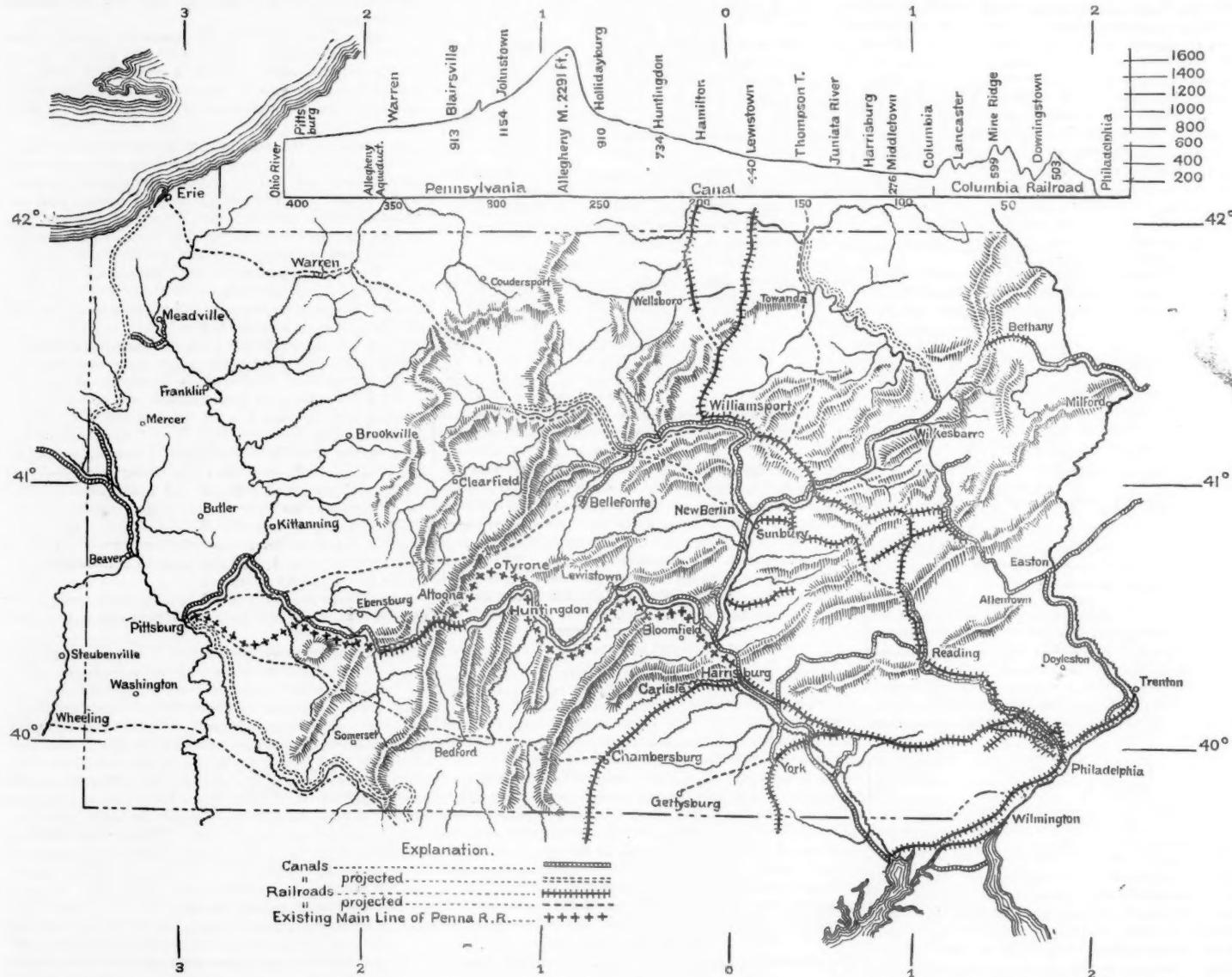
tion of Internal Improvement" was organized in November, 1824, with a membership of 48 public-minded citizens, who paid an initiation fee of \$100 and annual dues of \$10 each. Among the objects for which the society was organized was

"To open an entire and complete communication from the Susquehanna to the Allegheny and Ohio rivers, and from the Allegheny to Lake Erie."

The Society, impressed with the importance of the subject, went actively to work, and at a meeting held on the 19th of January, 1825, decided to "send an agent to Europe to collect information of all the valuable improvements in canals, roads, railways, bridges and all other information calculated to promote the objects of the Society."

At a meeting of the Society held Feb. 3, 1825, William Strickland, of Philadelphia, with Samuel Kneass (his pupil), were assigned by the Society to the important mission, and on the 20th of the following month they sailed.

In addition the attention of the Society was directed to the publication of papers showing the usefulness of canals and railroads. These labors were immediately successful—their papers were read with interest—and through the efforts of Gerard Ralston, their Corresponding Secretary, the attention of distinguished men in all parts of the East was



railroad from Manchester to Liverpool, between which large towns there now exists a spacious canal, demonstrates very forcibly its feasibility and great utility.

"The expense of the contemplated railroad is estimated at about \$5,000 per mile. One thousand shares, then, at five dollars each, would be sufficient for the construction of one mile of the road.

"An appeal is now therefore made to the enlightened patriotism and to the enterprising spirit of the good citizens of Philadelphia to step forward, and, by an advance of five dollars each, to place the contemplated improvement beyond all possibility of doubt or uncertainty.

"That the stock will, from the start, yield more than legal interest, there cannot be a shadow of a doubt. That it will, ultimately, and at no distant period, yield 12 per cent. per annum, is equally certain.

"The contemplated railroad will differ from turnpike roads in these very important particulars: The actual expense of transportation on the railroad will be reduced to one-quarter to what it now is on the existing turnpikes. But the most essential point of difference, as it regards stockholders, is, that the whole of the emoluments to be derived from the transportation of commodities, and from the conveyance of passengers, will go to the railroad company, whereas the turnpike company receives only a toll. The expense of repairs will bear no proportion to that incurred on turnpike roads. The railroad too will be equally good at all seasons of the year. This circumstance gives to a railroad a decided superiority also over a canal, which continues, for months, during the winter season, locked up by frost.

"But when, in the progress of improvement, the power of steam shall be substituted for that of horses, transportation will most assuredly be afforded at much less than on a canal. However extraordinary this opinion may appear, by a recurrence to calculation, it is, nevertheless, capable of demonstrative proof. And when this great improvement in

tion of which was then in operation, led the Legislature to pass an act on the 27th of March, 1824, "Providing for the appointment of a Board of Commissioners for the purpose of promoting the internal improvement of the state."

This Commission met with the same difficulty in obtaining the services of a competent engineer as was afterward experienced by the Baltimore & Ohio and other railroads, for at a subsequent meeting in May the President reported to the board, "That he had made most diligent search and anxious inquiry after an engineer," without success. The work was, however, carried on without a "competent engineer," the board in one of their subsequent reports stating, "We have found by observation and experience that purchasing the proper instruments and encouraging active men who have some general acquaintance with science to use them is the most effectual method for the state to get a proper corps of civil engineers."

On the 11th of April, 1825, an act was passed repealing former acts and providing for the appointment of five Canal Commissioners "to consider and adopt such measures as they shall think requisite and proper, preparatory to the establishment of a navigable communication between the eastern and the western waters of the state and Lake Erie," and several routes of all water communication were surveyed.

The discussion between the advocates of the railroad and canal in Pennsylvania continued, and the general subject of intercommunication became to be regarded of such importance that "The Pennsylvania Society for the Promotion

called to the importance of a liberal and extended encouragement of public works.

On the 18th of June Mr. Strickland completed his first report on railways and locomotive engines, and forwarded it. This report was followed on the 28th of July by a report on canals, and on the 3d of August by a paper on turnpikes.

As Mr. Strickland's reports were published and widely read by those interested, their influence upon the minds of those who were about to engage in canal and railroad construction cannot be estimated.

The battle between the friends of the railroad and the canal was waged with much earnestness during the early part of Mr. Strickland's absence, as the following extract from the correspondence between the Pennsylvania Society for Internal Improvements and its agents will show.

Extract from a letter addressed to William Strickland, Esq., on September 19, 1825:

"Canals and railways present the most important of all subjects for your attention. Upon every matter connected with both you will be expected to be well informed; and if you shall have to decide between them you must be able to furnish the facts and circumstances by which the decision shall be pronounced. Much excitement prevails in this state upon the question whether railways are superior to canals, and the inquiries that are in progress in relation to them are in the hands of men of ingenuity and well-disposed to the cause of internal improvement. It is, however, feared by many that the question between canals and railways will have an injurious influence in Pennsylvania, as it will divide the friends of the cause of improvement, and thus postpone, if not prevent, the commencement of the work. The im-

portance of correct information in relation to them is thus greatly increased."

Mr. Strickland shortly afterward returned to Philadelphia, and in 1826 his "Reports," profusely illustrated by large and handsome plates, was issued. In March, 1826, he was appointed Engineer of the proposed canal from Middletown to Holidaysburg, and he prepared a general map and estimate of its cost. Ground was broken for it July 4, 1826, and the work was soon put under contract. Previously the project of connecting this canal by a railroad with the Delaware River had not been thought feasible; and in the spring of 1827 surveys were completed for a canal, which was put under contract Oct. 13 of that year, and work was begun at Bristol and Easton. De Witt Clinton, Jr., of New York, was appointed Engineer of the Western or Juniata section, and Major John Wilson, who had been an officer of the Corps of Topographical Engineers, U. S. A., and "Chief Civil and Military Engineer of the State of South Carolina," was assigned to the surveys between the Delaware and the Susquehanna. He made careful surveys beginning at Valley Forge, on the Schuylkill 19 miles above Philadelphia, through the Chester Valley, Downingtown and Coatesville to the gap at the summit of Mine Ridge. Having decided that this route was impractical for a canal, in accordance with his instructions he began to make surveys and estimates for a railroad from Philadelphia through

grade; the line then continued up the dividing ridge for some distance, thence descending into the valley of Chester County and through Downingtown and Coatesville to Lancaster, thence to the head of the inclined plane at Columbia, descending 90 ft. in a length of 1,720, thence along the Susquehanna to the basin at the termination of the Pennsylvania Canal, the total length of the road being 81.6 miles.

There are 31 viaducts and 73 stone culverts on the line.

The contract for bridging and grading 40 miles of the road (20 miles at each end) was given out in April, 1829, and by Jan. 1, 1830, a large portion of the work was completed. The Legislature of 1829-30 made no appropriation for the further prosecution of the work, and during 1830 everything came to a standstill except the completion of what remained unfinished of the contract given out. This condition of affairs continued until March, 1831, when large appropriation was made by the state, and the work was resumed the contracts being awarded in May for grading and bridging the remaining 41 miles. Track-laying was proceeded with as fast as the grading was ready.

SUPERSTRUCTURE.

The combination of the strap-iron rail and granite stringer in use on the Baltimore & Ohio Railroad, and which was thought to possess great merit, was adopted at first for a few miles by the Engineers of the Philadelphia & Columbia road.

On April 16, 1832, a single track about 20 miles long from the head of the incline plane on the Schuylkill to the junction of the West Chester Railroad beyond Paoli was opened for travel. The whole road from Philadelphia to Columbia was formally opened in the presence of the Governor and members of the Legislature April 16, 1834.

EARLY LOCOMOTIVES.

Although the original designs, in making horse paths, was generally carried out, in 1832 Col. Stephen H. Long, of the U. S. Topographical Engineers, who, in March, 1830, had been appointed by the Board of Canal Commissioners to make a survey and examination of the different routes for crossing the Allegheny Mountains, having concluded his labors in that direction, was residing in Philadelphia, and became interested in experiments with locomotives, William Norris being associated with him.

In 1833 they constructed the first engine that ran on the road. It was called the "Green Hawk," and from what can be learned was not very successful. Their second engine, the "Black Hawk," was some improvement over the first, and they then constructed the third, which had no name, but was dubbed by the workmen the "Tomahawk."

These engines were frequently experimented with near the eastern terminus of the road. They were regarded as great curiosities, and invitations to accompany the inventors on the trial trips were eagerly accepted; but as it had been de-

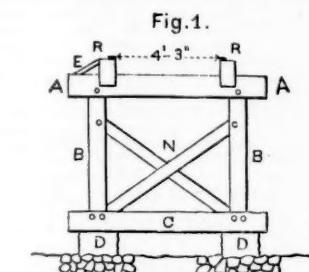


Fig. 2.

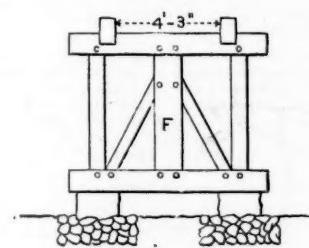


Fig. 6.

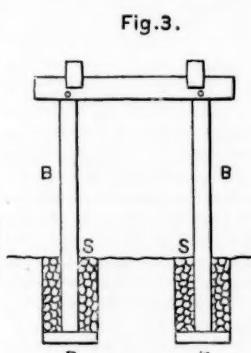
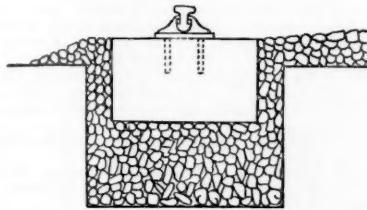


Fig. 3.

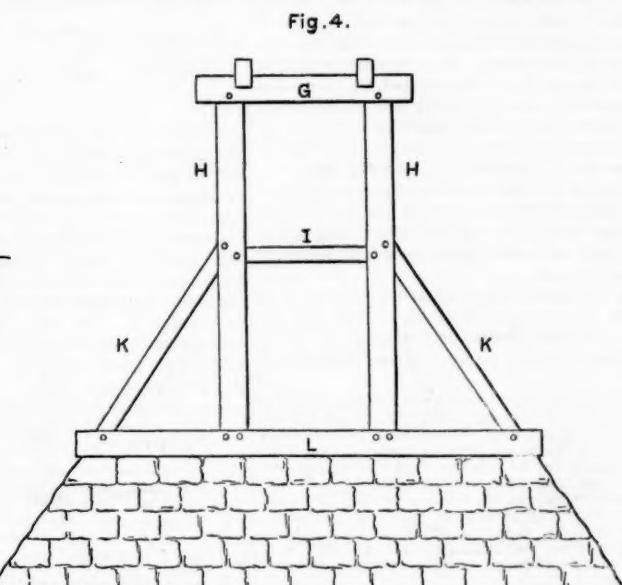
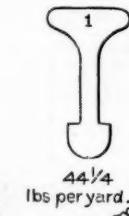
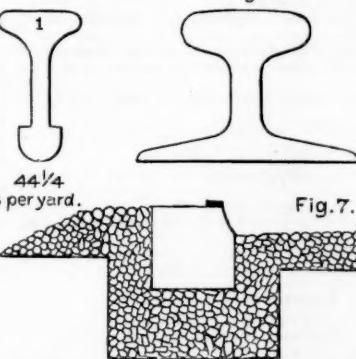
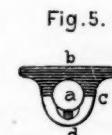


Fig. 4.

Fig. 9.

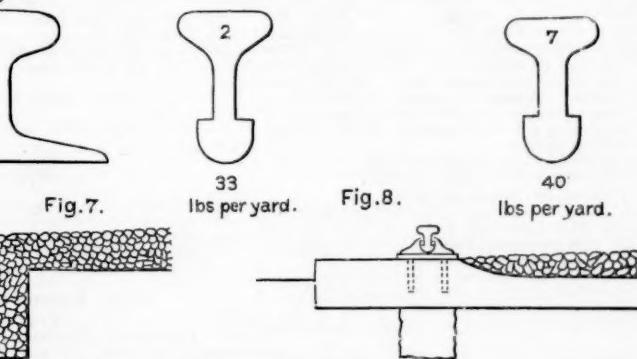


Fig. 7.



Fig. 8.

OLD METHODS OF CONSTRUCTION ON THE PENNSYLVANIA RAILROAD.

Chester and Lancaster counties to connect with the Eastern Division of the Pennsylvania Canal. These were completed Nov. 29 and he presented his reports to the board Dec. 17, 1827, and an approximate estimate Jan. 12 following.

March 24, 1828, just five years after John Stevens had succeeded in getting his act passed, the Legislature passed an act "to provide for the commencement of a railroad," to be built by the state, and in April Major Wilson began the location of the Philadelphia & Columbia Railroad with a corps of 12 men,* at Columbia. A report on the 29 miles from Columbia to the summit of Mine Ridge was made Aug. 15, and one on the remainder of the line Dec. 1. In April, 1829, the work was put under contract.

THE PHILADELPHIA & COLUMBIA RAILROAD.

The eastern terminus of this road was at the corner of Broad and Vine streets in the city of Philadelphia, whence the road extended in a straight line to Callowhill street; here the road curved to the northwest and passed on to the old "Pratt's Garden," where it entered a cut 70 ft. deep, excavated for a canal in 1792, and afterward abandoned; the line then followed the bed of this old canal slightly altered, and crossed the Schuylkill River below Peter's Island on a wooden bridge 1,045 ft. long, 7 spans, the abutments and piers of solid masonry.

On the west bank of the river was the foot of an inclined plane 2,805 ft. long, rising 187 ft. straight and uniform in

About 6 miles of track were laid with it before its demerits were fully understood. The strap-iron rail $2\frac{1}{2}$ in. $\times \frac{1}{8}$ in. (see fig. 7) was, however, placed nearer the middle of the stringer than on the Baltimore & Ohio.

The stone stringers were from 3 to 12 ft. long, 12 in. deep and 12 in. wide, and rested upon a layer of broken stone laid in a longitudinal trench 2 ft. wide and cut 10 in. below the bottom of the sill. The spikes which held the rail were driven into locust plugs which were put in holes $\frac{1}{8}$ in. in diameter and $3\frac{1}{2}$ in. deep. The bars were 15 ft. long, and a horse-path of gravel and broken stones 6 in. deep was made between the tracks.

On the remainder of the line rolled "edge rails" were adopted.

They were in lengths of 15 ft., being $3\frac{1}{2}$ in. high, and weighed about $41\frac{1}{2}$ lbs. to the yard, costing \$50.50 per ton delivered at Philadelphia. The chairs weighed 15 lbs. each, and each wedge about 10 ounces. All the track material was imported from England, where it cost £6 17s. 6d. per ton. These chairs were either supported by stone blocks 20 in. \times 12 in. or 12 in., or stone stringers 12 in. deep, as shown in fig. 6, or upon wooden cross-ties laid on longitudinal sleepers as shown in fig. 8.

The length of the single track, exclusive of sidings and crossings, was 163.2 miles, of which 6 miles were laid with granite sills plated with strap-iron; 18 miles with wooden stringers similarly plated; and the remainder was stone blocks and edge rails, having cross-ties at intervals of 15 ft. On two miles the cross-ties were of stone and on the remaining distance of wood.

Different portions of the road were operated as fast as built, for construction purposes. On the 20th of Septem-

ber, 1832, a single track about 20 miles long from the head of the incline plane on the Schuylkill to the junction of the West Chester Railroad beyond Paoli was opened for travel.

The whole road from Philadelphia to Columbia was formally opened in the presence of the Governor and members of the Legislature April 16, 1834.

Messrs. Long and Norris afterward established a locomotive manufactory at Bush Hill, and built engines for several of the roads in the neighborhood. Shortly after the road was opened, Mr. Baldwin's success with the "Ironsides" on the Germantown road, and the "Miller," built for the Charleston & Hamburg road of South Carolina, led the Commissioners to order a locomotive, and in June, 1834, the "Lancaster" weighing 17,000 lbs. and having six wheels, was completed and delivered to the road for service. This was the first engine that went into regular service on the Pennsylvania Railroad.

The American Railroad Journal of March 21, 1835, speaking of this engine, says:

"The passenger cars on the Columbia Railroad are propelled by a locomotive engine. The trip from Philadelphia to Columbia, 82 miles, is made in about six hours, and it is believed that it will soon be made in four hours."

The experiments with this engine were so gratifying to the state Board of Commissioners that they decided to use steam locomotives, and by June 1, 1835, nine engines were at work on the road.

The following is from the *American Railroad Journal* of June 20, 1835:

"There are seven of these Baldwin engines at work on the Pennsylvania state road, on which they also have two English engines from the workshop of the most celebrated maker, R. Stephenson. The engineer who had charge of the locomotive department on this road informs me that the power of the American engines is 35 per cent. greater than that of the English."

"The Pennsylvania road is almost a continuous series of

* There were some men who afterward became eminent in their professions, wh ch were: Joshua Scott, Principal Ass'tant; Robert Petit and John Edgar Thomson, assistant engineers; John P. Baiy, Samuel W. Mifflin, Wm. Hasell Wilson, J. Branton Moore, rod-men; Wm. J. Lewis, Wm. W. Tolbert, John G. Davis and James Moore, chain-men.

curves, varying from 500* to 700 ft. radius, and so severe is it upon the wheels of an engine, that one of the English engines, the other having been out of repair most of the time, has, within two months, used up a part of the wheels on both engines."

By the end of the year 1835, the company had purchased 17 locomotives, four of which were constructed in England by Stephenson & Co.

When the road was first opened it was operated as a public highway. Individuals and transporting firms owned the horses and cars. The latter were made of every conceivable size and shape, their capacity being from three to four tons. The drivers were rough fellows and often gave great trouble through their stubbornness. No time-tables were then in force, and while only a single track of the road was being operated they often gave much annoyance.

The right of way was determined by the following rule: Half way between the turn-outs, which were $1\frac{1}{4}$ miles apart, a large post (called the centre post) was set up, and when the drivers on single track met between turn-outs, the one who had passed the centre post had the right to go on and the other was compelled to go back.

As the road was so crooked that the drivers could not see far ahead, each would drive slowly after leaving the turnout, for fear he might have to be turned back. As he approached the centre post he accelerated his speed, hoping to get beyond it before his rival reached it. Many exciting races and not a few accidents resulted from the eagerness of these drivers to gain their point. Soon after the road was opened it became evident to the managers that in order to operate the road successfully it was desirable that the state should own all the motive power. This was bitterly opposed by those living along the line of the railroad, on the ground that as the people were taxed to build and maintain the railroad, the farmers along the line should have the right to drive their own horses and cars to and from the Philadelphia market the same as on the turnpike. Among those who took this ground was the late Thaddeus Stevens, who was the leader of his party at that time in the Legislature. After considerable opposition a bill was finally passed, and it was decided that the motive power should all be owned and managed by the state.

The following is condensed from an article descriptive of the Philadelphia & Columbia Railroad, written for the *Journal of the Franklin Institute* of May, 1840, by W. H. Wilson, now Consulting Engineer of the Pennsylvania Railroad:

"The rates of toll for the use of road vary from 6 mills to 4 cents per ton (of 2,000 lbs.) per mile. There are 12 different rates, the average of which would be 2 cents per ton per mile. The lowest rates are for coal, stone, iron ore, vegetables, lime, manure and timber, and the highest are for dry goods, drugs, medicines, steel and furs.

"On the United States mail the toll is one mill per mile for every 10 lbs. On every passenger, one cent per mile. In addition to these rates, a toll is levied of one cent per mile on each burthen car, two cents per mile on each baggage car and on every passenger car one cent per mile for each pair of wheels.

"The motive power toll is, for each car having four wheels, one cent per mile; for each additional pair of wheels, 5 mills; for each passenger, one cent per mile, and for all other kinds of loading 12 mills per ton (of 2,000 lbs.). The owners of cars now charge \$8.25 for every passenger, and \$7.50 for every ton of merchandise conveyed the whole length of the road, they paying all tolls, which is at the rate of four cents per mile for passengers, and 9.14 cents per mile for a ton of goods. Taking the length of the road at 82 miles, the average number of passengers to an 8-wheel car at 30, and the load of a 4-wheel burthen car at 3 tons, we have the following results:

"Road toll on an 8-wheel car, 4 cents per mile.

Road toll on 30 passengers, 30 cents per mile.

Motive power toll on car, 2 cents per mile.

Motive power toll on 30 passengers, 30 cents per mile.

Total toll for 30 passengers, 66 cents per mile, or 2.2 cents per mile for each passenger, leaving 1.8 cents per mile to the owners of the car for every passenger.

Road toll on a 4-wheel burthen car, 1 cent per mile.

Road toll on three tons of dry goods, 12 cents per mile.

Motive power toll on car, 1 cent per mile.

Motive power toll on three tons of dry goods, 3.6 cents per mile.

Total toll on three tons of dry goods, 17.6 cents per mile, or 5.86 cents per mile per ton to the owner of the car.

At that time—the

Superintendent of motive power received \$4 per day.

Agents for passenger trains (now called conductors), \$2 per day.

Agents for burthen trains (now called conductors), \$1.50 per day.

Conductors of state cars, \$1.25 per day.

Master machinist, \$4 per day.

Foreman of workshops, \$2 per day.

Signalmen and assistants, \$1.25 per day.

Engineers of locomotives, \$2 per day.

Firemen of locomotives, \$1.25 per day.

The Philadelphia & Columbia Railroad suffered the same inconvenience as the other railroads of the early times from the difficulty of obtaining competent mechanics to repair their locomotives and capable engineers to run them. Men who understood the construction of the locomotive and its working were in great demand and were permitted to do pretty much as they pleased. They started when they were ready, ran at whatever speed they wanted to, and managed the train as they desired. They were masters of the situation and were a law unto themselves. This condition of affairs became so unsatisfactory to the patrons of the road that a committee was appointed by the Legislature "to examine into and report upon the present state of the motive power of the Philadelphia & Columbia Railroad." The report which it made shows a frightful lack of order and system in the working of the road.

The Allegheny Portage Railroad, by which the canal between Columbia and Holidaysburg was connected with the canal west of the mountains, which completed the line to Pittsburgh, was begun in 1831 and opened for traffic

* The minimum radius of curvature when the road was constructed (for horse cars) was 631 ft.

March 18, 1834. It was 38 $\frac{1}{2}$ miles long from Holidaysburg to Johnstown. Sylvester Welch, brother of the late Ashbel Welch, was the chief engineer. From Johnstown to the summit, 28.59 miles, the ascent was 1,172 ft.; from Holidaysburg to the summit, 10.1 miles, it was 1,399 ft. There were five inclined planes on each side of the summit. A tunnel 901 ft. long near Johnstown was the first railroad tunnel built in America. During the first winter the working of the road was suspended after the canals were closed. During 1835, more than 50,000 tons of freight and 20,000 passengers were carried over the road.

The rails on this road, imported from England at a cost of \$48.05 per ton in Philadelphia, weighed 40 lbs. per yard. They rested in cast-iron chairs weighing 18 lbs. each, which were fastened to stone blocks of about 3 $\frac{1}{2}$ cubic feet, each placed 3 ft. from centre to centre and imbedded in broken stone. On the inclined planes and on some other parts of the road flat rails were used on longitudinal timbers. The stationary engines at the top of each plane were of 35 horsepower, and raised and lowered trains of four cars with a net load of 7,000 lbs., which they were able to do from six to ten times an hour. On the long level of 13 miles four locomotives were used. Up to Jan. 1, 1836, the road had cost about \$1,700,000.

The Western Division of the canal was opened as early as 1830.

The entire line from Philadelphia to Pittsburgh when first opened was composed as follows:

	Miles.	Cost.
Philadelphia & Columbia Railroad.....	81.6	\$5,277,278
Eastern Division Canal.....	172.0	5,313,251
Portage Railroad.....	36.7	1,860,733
Western Division Canal.....	105.0	3,173,432
	395.3	\$15,624,714

This line was the predecessor rather than the beginning of the Pennsylvania Railroad as it exists to-day between Philadelphia and Pittsburgh, only the Philadelphia & Columbia Railroad, and that greatly modified in location, forming a part of the present road, which, however, follows the line of the canal for a considerable distance. It is interesting to note that the present railroad, only 354 miles between Philadelphia and Pittsburgh, taking the place of the pioneer route that cost \$15,624,714, earned during the year 1883 no less than \$26,720,293 gross and \$12,318,055 net—thus magnificently justifying the high hopes of the pioneers who planned the route before the locomotive had demonstrated its efficiency to the world.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings will be held as follows:

Delaware & Hudson Canal Co., annual meeting, at the office in New York, May 18, at noon.

Lake Shore & Michigan Southern, annual meeting, at the office in Cleveland, O., May 7.

Michigan Central, annual meeting, at the office in Detroit, Mich., May 8.

New York Central & Hudson River, annual meeting, at the office in the Union Depot in Albany, N. Y., April 16, at noon.

New York, Chicago & St. Louis, annual meeting, in Cleveland, O., May 7.

Vicksburg & Meridian, annual meeting, at the office in New York, May 5, at noon.

Dividends.

Dividends have been declared as follows:

Dubuque & Sioux City (leased to Illinois Central), 2 $\frac{1}{2}$ per cent., semi-annual, payable April 16.

St. Paul, Minneapolis & Manitoba, 2 per cent., quarterly, payable May 1. Transfer books close April 16.

Joint Executive Committee.

Notice has been sent out calling a meeting of the Joint Executive Committee (Passenger Department) for April 22, the object of the meeting being to complete the pools by Ontario points and to renew the differential fare contracts.

Southern Association of General Passenger and Ticket Agents.

At the meeting held in Charleston, S. C., April 9, 21 roads were represented.

A basis for making summer excursion rates was adopted. The figures are about the same as those of last year. Resolutions were adopted commending the New Orleans Exposition and recommending liberal concessions. Richmond, Va., was selected as the place for holding the fall meeting.

General Time Convention.

At the spring meeting in Cincinnati, April 9, there was a full attendance. It was resolved to adopt the schedule of last summer for the coming season. A report on uniform train signals was referred to the general managers, each road to report to the Executive Committee before the system is finally adopted. The next meeting will be held in Philadelphia on Oct. 9.

Engineers' Society of Western Pennsylvania.

Members of the Engineers' Society of Western Pennsylvania, accompanied by a number of government engineers employed in the vicinity of Pittsburgh, and other invited guests, made an excursion on April 2 from Pittsburgh to Johnstown. About 175 persons joined in the excursion. A special train carried them to Johnstown with short stops by the way at the glass works at Creighton and the iron works at Apollo. At Johnstown the party were shown through the Cambria Iron Works, making a pretty thorough inspection of the mills there. After taking lunch they returned to Pittsburgh on the special train, making a stop by the way at the Edgar Thompson Steel Works.

ELECTIONS AND APPOINTMENTS.

Allegheny Valley.—At the annual meeting in Pittsburgh, April 8, the following directors were chosen: B. F. Jones, David A. Stewart, John Scott, Pittsburgh; A. J. Cassatt, J.

N. DuBarry, John P. Green, Henry M. Phillips, George B. Roberts, Edmund Smith, Philadelphia.

Baltimore & Ohio.—Mr. E. W. Gault has been appointed Master of Trains of the Chicago Division, in place of C. W. Sayre, resigned. Mr. P. S. Givan has been appointed Foreman of the car shops at Chicago.

Bedford & Bloomfield.—This company has elected John Thomas President; W. C. Winstanley, Vice President and Treasurer; J. W. Kennedy, Superintendent; E. J. Robinson, Auditor; S. W. Morgan, Secretary.

Buffalo, New York & Philadelphia.—The following circular from the office of President G. Clinton Gardner is dated New York, April 1: "By authority of the board of directors, John Dougherty has been appointed Treasurer of this company, to take effect this date, vice F. S. Buell, resigned. Office, Mills Building, New York."

"Mr. Franklin S. Buell is hereby appointed Cashier of this company, to take effect this date, with office at No. 43 Exchange street, Buffalo, New York."

"Mr. Dougherty was recently Comptroller of the Denver & Rio Grande. Mr. Buell has been connected with the company almost from its first organization.

"Mr. F. J. Martin has been appointed Train-Master of the Rochester Division in place of D. D. Randall, resigned.

Burlington, Cedar Rapids & Northern.—General Superintendent C. J. Ives has been chosen Vice-President of this company.

Charleston & Savannah.—Mr. W. M. Davidson is appointed General Traffic Agent for Florida, with headquarters at Jacksonville, to date from April 1.

Chicago & Alton.—At the annual meeting in Chicago, April 7, the three directors whose terms then expired were re-elected, as follows: James C. McMullin, George Straut, Chicago; John F. Slater, Norwich, Conn. The board elected T. B. Blackstone President; James C. McMullin, Vice-President; Charles H. Foster, Secretary and Treasurer; C. H. Chappell, General Manager; C. Kelsey, Auditor; C. Beckwith, Attorney.

Officers for the leased lines were elected as follows on the same day: *Alton & St. Louis*.—President, Lorenz Blackstone; Secretary and Treasurer, T. B. Blackstone. *Joliet & Chicago*.—President, John Crerar; Secretary and Treasurer, Charles H. Foster. *Mississippi River Bridge Co.*.—President, John Crerar; Secretary and Treasurer, Charles H. Foster. *St. Louis, Jacksonville & Chicago*.—Directors, T. B. Blackstone, John Crerar, N. W. Green, George Straut, L. E. Worcester.

Chicago & Atlantic.—Mr. Edward Larkin, late Chief Clerk in the General Freight office, has been appointed Local Freight Agent in Chicago.

Chicago, St. Louis & Pittsburgh.—The directors of this company, as consolidated, met April 3 and elected the following officers: G. B. Roberts, President, succeeding Wm. L. Scott in that office; J. N. McCullough, First Vice-President; Wm. Thaw, Second Vice-President; Thomas D. Messler, Third Vice-President and Comptroller; S. B. Liggett, Secretary; John E. Davidson, Treasurer; M. C. Spencer, Assistant Treasurer.

Cincinnati, Washington & Baltimore.—At the annual meeting in Cincinnati, April 9, the following directors were elected: Orland Smith, George Hoadly, James D. Lehmer, J. L. Heck, W. W. Peabody, Cincinnati; W. T. McClintick, Chillicothe; Robert Garrett, John C. Walsh, Baltimore; E. R. Bacon, New York. The directors at a subsequent meeting elected Orland Smith President; E. R. Bacon, Vice-President; Charles F. Low, Secretary; W. E. Jones, Treasurer; J. H. Stewart, General Manager.

Cleveland, Columbus, Cincinnati & Indianapolis.—Gen. Michael T. Donohoe has been appointed New England Passenger Agent, with office in Boston.

Colorado Coal & Iron Co..—At the annual meeting in Colorado Springs, Col., April 8, the following directors were chosen: Coleman Benedict A. H. Danforth, J. E. Devlin, W. A. Dick, W. B. Lawrence, Thomas F. Ryan, A. Rutten John H. Small, Henry E. Sprague. This is a new board and is a defeat for the Palmer party or old management.

Denver & Rio Grande.—At the annual meeting, April 7, the following directors were chosen: D. H. Moffatt, Denver, Col.; Wm. L. Scott, Erie, Pa.; A. J. Cassatt, Philadelphia; Addison Cammack, Adolph Engler, Frederick Lovejoy, L. H. Meyer, Henry E. Sprague, F. F. Woerishoffer, New York. The only new director is Mr. Moffatt, who succeeds D. C. Dodge, the late General Manager.

Duluth, Fargo & Black Hills.—This company has elected officers as follows: J. C. Gill, President; W. A. Kindred, Vice-President; Jacob Lowell, Jr., Secretary; Samuel W. Mairs, Treasurer; Gen. George P. Wilson, Attorney. Office in Fargo, Dakota.

Indiana, Illinois & Iowa.—Mr. R. C. Ackley is appointed Master Mechanic, with office in Kankakee, Ill., in place of T. W. Newell, resigned.

Jacksonville, Tampa & Key West.—Mr. M. R. Moran is appointed Superintendent of this road, the appointment taking effect April 4.

In addition to his duties as Superintendent he will continue in charge of the passenger and freight business as General Passenger and Freight Agent.

Kansas City Fort Scott & Gulf.—Mr. Norman C. Jones has been appointed General Agent at New Orleans for both the freight and the passenger departments.

Lackawanna & Pittsburgh.—Mr. D. D. Randall has been appointed Chief Train Dispatcher, with office at Angelica, N. Y. He was recently on the Buffalo, New York & Philadelphia.

Long Island.—At the annual meeting in Long Island City N. Y., April 8, the following directors were chosen: Demas Barnes, J. D. Campbell, Austin Corbin, Daniel C. Corbin, James Gracie King Duer, Henry Graves, Wm. B. Kendall, Henry W. Maxwell, J. Rogers Maxwell, Frederick W. Peck, Alfred Sully, John P. Townsend, Edward Tuck. This is the old board.

McPherson, Kingman & Fort Worth.—The officers of this new company are as follows: G. W. Hartzell, President and General Manager; L. C. Almond, Vice-President; Randolph Hatfield, Treasurer; Oliver Mulvey, Chief Engineer; O. H. Bentley, Secretary and Attorney. The President's office is in Wichita, Kan.

Mexican Central.—At the annual meeting in Boston, April 7, the following directors were chosen: Oliver Ames, Isaac T. Burr, Benjamin P. Cheney, Jacob Edwards, Andrew B. Lawrie, Albert W. Nickerson, Thomas Nickerson, Charles J. Paine, Wm. Rotch, Warren Sawyer, Levi C. Wade, George B. Wilbur, Boston; Arthur Sewall, Bath, Me.; Levi Z. Leiter, Chicago; Robert R. Symon, London, England; Sebastian Camacho, Daniel B. Robinson, Mexico. The new members of the board are Messrs. Arthur Sewall,

Jacob Edwards, George B. Wilbur, Oliver Ames, Daniel B. Robinson and Warren Sawyer. They succeed Messrs. Frank Morrison, R. M. Pulsifer, Theodore Nickerson, F. L. Ames, Rudolph Fink and Ramon Guzman. Mr. Sawyer, it was announced, would fill the vacancy occasioned by Mr. Guzman's death, and until such time as some gentleman who is a resident of Mexico could be agreed upon.

The new board met the same day and organized by the election of Thomas Nickerson, President; Robert R. Symon, Vice-President; Levi C. Wade, Second Vice-President; S. W. Reynolds, Clerk and Treasurer; J. H. Goodspeed, Auditor, and D. B. Robinson, General Manager.

Missouri Pacific.—The following appointments of live stock agents took effect April 1, on the resignation of Mr. L. Doak:

Mr. W. H. Newman, Traffic Manager, Galveston, Tex., will assume contro' of the live stock traffic of these lines in the states of Texas and Louisiana.

Mr. J. B. Wadeigh, Division Freight Agent, Little Rock, Ark., will have charge of the live stock traffic of the St. Louis, Iron Mountain & Southern Division.

Mr. Isaac Johnston, Live Stock Agent for the Missouri Pacific lines in the Indian Territory, Kansas and Missouri, from Denison, Tex., to Kansas City, Mo., including the main line and branches east of Kansas City to the Mississippi River, with office at Sedalia, Mo.

Mr. T. B. Earley is appointed Live Stock Agent for all the lines embraced in the Wabash, St. Louis & Pacific system and in the Missouri Pacific system north of and including Kansas City, with office at St. Louis.

Panama.—At the annual meeting in New York, April 7, the following directors were chosen: Wm. P. Dinsmore, J. W. Ellis, E. P. Fabbri, Charles G. Franklyn, George Garr, J. G. McCullough, Thomas Maddock, D. O. Mills, Joseph Ogden, Theodore J. de Sabla, Jesse Seligman, Richard W. Thompson, E. F. Winslow.

Richmond & Chesterfield.—The incorporators have elected R. H. Jones, Chairman; T. B. Biddle, Secretary and Treasurer; T. B. Dorsett, Superintendent; A. Langstaff Johnston, Chief Engineer. Office in Petersburg, Virginia.

Rochester & Pittsburgh.—Mr. R. W. Davis is appointed Traveling Freight Agent, and Mr. F. B. Kinsley, Freight Solicitor in Buffalo.

St. Louis & Cairo.—The office of General Freight and Passenger Agent is abolished or suspended for the present. Mr. Robert Bell has been appointed Assistant General Freight and Passenger Agent, and all communications should be addressed to him.

Savannah, Florida & Western.—Mr. W. M. Davidson is appointed General Traffic Agent for Florida, with headquarters at Jacksonville, appointment to take effect April 1.

Staten Island.—The new board has elected Erastus Wyman President; Nicholas G. Miller, Vice-President; John T. Stephens, Secretary; Holton Wood, Treasurer.

Union Pacific.—A report comes from Chicago that changes in the management of this company have been practically decided upon, and they may go into effect May 1. It is said the idea is to have four vice-presidents, each of whom will have full charge of a certain department. The men for the new positions have already been selected, it is said. Mr. Elisha Atkins, the present Vice-President, will have charge of the department of finance, though possibly he will decline the position, which in that case will be tendered to Mr. F. L. Ames; Mr. S. H. H. Clarke, the present General Manager, will be one of the new vice-presidents, and will be at the head of the department of construction and relations with connecting lines; Mr. Thomas L. Kimball, Assistant General Manager, will be another vice-president, and will be in charge of the department of traffic; and Mr. S. R. Callaway, at present General Manager of the Chicago and Grand Trunk, will be the fourth vice-president, and will be the head of the department of operation.

The Boston *Advertiser* of April 8 says: "The executive committee of the Union Pacific directors held its regular weekly meeting in this city yesterday, but did no business of importance. Mr. Atkins will continue Vice-President, and will, as for a number of years past, have charge of the finance department, while the other gentlemen named for a vice-president's position will act as the executive heads of their respective departments. Mr. Callaway, the General Manager of the Chicago & Grand Trunk road, has already consented to come to Boston to act as an assistant to the directors, and to assume the charge of details which now come largely upon Mr. Ames. He will spend a part of his time on the line of the road. His salary will not, however, be \$25,000, or anything like it, as reported."

Wabash, St. Louis & Pacific.—Mr. John Tierney has been appointed General Road-Master. He was recently on the Chicago, Rock Island & Pacific, and was Secretary of the Road-Master's Association.

The following appointments of assistant claim agents have been announced by Wm. E. Jones, General Claim Agent: E. V. Bennet, Peru, Ind., in charge of the line, Detroit to Logansport; Toledo to Tilton; Tilton to Milan; Michigan City to Indianapolis, and Decatur to Covington, Ind. M. W. Cook, Forrest, Ill., will have charge from Chicago to Bement; Bement to Altamont and Effingham; Fairbury to Streator; Leroy to West Lebanon; Havana to Sidney, and Decatur to White Heath, Ill. Nathaniel Shadbolt, Peoria, Ill., will have charge from Logansport to Keokuk; Burlington Branch; Warsaw Branch; Peoria to Jacksonville, and Havana to Springfield, Ill. A. M. Gregory, Springfield, Ill., will have charge from East St. Louis to Tilton; Jerseyville Branch; Decatur to Quincy; Kanniball Branch; Clayton to Elvaston; Pittsfield Branch and Edwardsville Branch. Z. L. Cooper, of Cairo, Ill., will have charge of the Cairo Division from Cairo to Tilton, Ill. W. P. Palmer, Centerville, Ia., will have charge from Keokuk to Des Moines; Centerville to Humeston; Des Moines to Fonda; Glenwood Junction to Ottumwa; Council Bluffs to Roseberry, and Roseberry to Clarinda, Ia. L. J. Colburn, Moberly, Mo., will have charge from St. Louis to Kansas City; Lexington and St. Columbia Branch, and Brunswick to Roseberry, Mo. J. R. Nelson, Moberly, Mo., will have charge from Moberly to Glenwood Junction, and Quincy to Trenton, Mo.

Mr. T. B. Earley is appointed Live Stock Agent, with office in St. Louis.

Weston, Spencer & Ravenswood.—At the annual meeting in Spencer, W. Va., the following directors were chosen: For Calhoun County, G. W. Hays, Frank Haymaker, John E. Laughlin; for Gilmer County, C. B. Conrad, Peregrine Hays, R. F. Kidd; for Jackson County, Henry C. Flesher, George J. Walker; for Roane County, S. A. Greathouse, L. D. Simmons, A. A. Smith, Wm. Woodyard.

PERSONAL.

Mr. T. W. Newell has resigned his position as Master Mechanic of the Indiana, Illinois & Iowa road.

Mr. George H. Smith has resigned his position as Gen-

eral Freight and Passenger Agent of the St. Louis & Cairo road.

Mr. C. W. Sayre, Master of Trains of the Chicago Division of the Baltimore & Ohio road, has resigned his position.

Mr. George B. Campbell has resigned his position as General Passenger Agent of the Fort Wayne, Cincinnati & Louisville road.

Mr. E. T. Affleck has resigned his position as General Freight and Passenger Agent of the Cleveland, Mt. Vernon & Delaware road. Mr. Affleck was the first railroad officer to adopt the "24 o'clock" system in the published timetables of his road.

In our number for March 28 we published a statement that Mr. Abraham Klohs had resigned his position as Superintendent and Master Mechanic of the Ogdensburg & Lake Champlain road on account of advanced age. The statement came to us on what appeared to be the best authority, and was published accordingly. Mr. Klohs now informs us that it was not true, that he has not resigned and has no intention of doing so. We make the correction willingly, and hope that Mr. Klohs may continue for a long time able to perform the duties of the position which he has filled so acceptably in the past.

A dispatch from Wheeling, W. Va., April 8, says: "Robert H. Hunter, for the past 10 years ticket agent of the Pittsburgh, Cincinnati & St. Louis and the Cleveland & Pittsburgh railroads at Mingo, Jefferson County, O., has left for parts unknown, leaving a deficit in his cash account estimated at \$7,000. Hunter handled on an average \$20,000 a month. He had the entire confidence of the officers of the companies employing him, and stood high in business circles in this city, where he was well known. Speculation is at the bottom of his trouble. The railroad auditors are now examining his books."

Mr. Henry Hitchcock died in Galesburg, Ill., April 4, aged 67 years, of paralysis of the brain. He was born in Old Deerfield, Mass., in 1816, and as a young man was employed on the Rutland & Burlington road in Vermont. Later he came to Chicago and was for several years in the employ of the Michigan Central. In 1858 he was made Assistant Superintendent of the Chicago, Burlington & Quincy under Col. C. G. Hammond, then General Superintendent. In 1866 he was made Superintendent of the Galesburg Division, with headquarters in Galesburg. In June, 1881, after having served 25 years on the road, he resigned on account of ill health, and has since lived quietly at his home in Galesburg. Mr. Hitchcock was widely known among railroad men, many of whom received their first training under him, and was highly esteemed wherever he was known.

Edward Haight Phelps, late Chief Engineer of the Michigan Central Railroad, whose death, on March 20, we have already noted, was born in Middlebury, Vt., June 30, 1847. In 1866 he entered Yale College, and graduated in 1870. Selecting civil engineering as a profession, he entered the Engineering Department of the University of Vermont, and received his degree of C. E. in 1872. After completing his technical course he spent a year in study in Europe; upon his return he spent a short time upon the New York, Boston & Montreal road, but was soon after made City Engineer of Burlington, Vt. He was next assistant to Chief Engineer Hale in the building of the Burlington & Lamoille road. In 1878 he made surveys and plans for the complete reconstruction of the Panama Railway, including a new system of water supply for Panama. In 1880 he was appointed Chief Engineer of the extension of the Jackson, Lansing & Saginaw Division of the Michigan Central to Mackinaw; in 1882 he was private secretary to General Manager Ledward, and in 1883 was promoted to the position of Chief Engineer of the entire Michigan Central system. His last work was in connection with the extension and rearrangement of the Detroit yards and with the Niagara cantilever bridge, more particularly with its approaches and its connections.

TRAFFIC AND EARNINGS.

Grain Movement.

For the week ending March 29 receipts and shipments of grain of all kinds at the eight reporting Northwestern markets and receipts at the seven Atlantic ports have been, in bushels, for the past eight years:

Year.	Northwestern receipts	Northwestern shipments	Atlantic receipts
1877.....	1,711,439	1,574,082	1,407,705
1878.....	4,002,086	3,636,491	4,009,220
1879.....	2,754,786	2,633,368	4,901,466
1880.....	4,426,124	5,057,314	6,746,935
1881.....	4,002,244	2,538,403	4,000,421
1882.....	2,341,528	1,681,742	1,188,941
1883.....	4,718,736	2,356,896	3,483,836
1884.....	4,171,067	4,176,111	2,823,541

Thus the receipts of the Northwestern markets for the week were 547,000 bushels less than in the corresponding week of last year and less also than in 1880, but greater than in any other year. They were smaller, however, than in any other week of this except the second week of January.

The shipments of these markets were larger this year than in any other except 1880, and the largest since November last. These shipments being greatly affected by the rates charged we give them for four successive weeks, as follows:

Week ending—	March 8.	March 15.	March 22.	March 29.
Flour, bbls....	126,096	222,496	224,821	230,950
Grain, bu...2,697,966	3,359,514	3,339,566	4,176,111	

The reduction from the regular (but not maintained) rate of 30 cents to 20 was made March 13; to 15 March 20. There have not been many weeks when the rail shipments were larger than in the last of these. The quantity that went down the Mississippi was 204,900 bushels, or 4.9 per cent. of the whole.

The receipts of the Atlantic ports, however, were less this year than in any of the other seven except 1877 and 1882, though all the receipts of the week were probably shipped from the West after the 20 cent rate was made, and a considerable part after the 15 cent rate. Still they were 217,000 bushels more than in the previous week of this year and were the largest since the canal was closed.

While the total Northwestern receipts have decreased since rates were reduced the Chicago receipts have increased somewhat, and in the week in question were the largest since February. The decrease has been at St. Louis and Peoria, chiefly.

Baltimore again had unusually large receipts, and Philadelphia larger than usual this winter.

For this week, ending March 29, the exports of Atlantic ports for five successive years have been:

1880.	1881.	1882.	1883.	1884.
Flour, bbls. 76,319	137,226	82,026	131,112	116,748

Thus the exports were much less this year than in any other of the five except 1882.

Railroad Earnings.

Earnings for various periods are reported as follows:

Three months ending March 31:

1884.	1883.	Inc. or Dec.	P.c.
Canadian Pacific. \$771,244	\$679,844	I. \$91,400	13.4
Central Iowa. 324,293	273,090	I. 51,206	18.7
Chi. & Alton ... 1,933,807	1,870,464	D. 63,343	3.4
Chi. & East. Ill. 346,779	390,718	D. 43,939	11.2
Chi. & Mil. & St. P. 4,574,000	4,659,974	D. 85,974	1.9
Chi. & Northwest. 4,658,100	4,764,309	D. 106,208	2.2
Chi. & St. Paul, M. & Omaha. 1,123,300	1,032,703	I. 90,507	8.7
Chi. & W. Mich. 349,159	350,101	D. 942	0.3
Det. Lam. & No. 297,262	339,620	D. 42,358	15.4
Flint & Pere M. 596,785	586,737	I. 10,048	1.7
Flor. Ry. & N. Co. 269,080	232,397	I. 36,683	13.8
Ft. Worth & D. 80,300	75,200	I. 5,100	6.8
Little Rock, M. R. 119,911	132,630	D. 12,719	9.5
& T. 82,333	104,238	D. 21,905	21.1
Long Island.... 437,950	421,251	I. 16,699	4.0
Louisv. & Nash. 3,232,118	3,274,879	D. 42,761	1.3
Mary. H. & O. 66,442	57,775	I. 5,087	9.8
Memphis & Chi. 337,546	318,194	I. 19,382	6.1
Mil. L. S. & W. 246,535	210,061	I. 36,474	17.4
Mil. & Northern 118,715	100,355	I. 18,360	18.2
Mobile & Ohio. 530,584	569,301	I. 39,715	5.2
No. Pacific. 1,086,000	1,331,258	D. 654,742	49.2
Peoria, Dec. & E. 1,986,000	1,501,979	I. 38,250	25.3
Rich. & Dan. 638,044	933,905	D. 5,039	0.6
Roch. & Pitts. 231,461	74,274	I. 157,187	21.6
St. L. & San Fr. 1,064,801	866,288	I. 198,513	22.9
St. P. & Duluth. 202,478	229,138	I. 17,660	8.0
Shenandoah Vy. 167,729	139,030	I. 28,690	20.5
Western N. C.... 92,179	73,814	I. 18,363	24.8

Two months ending Feb. 29:

Chi. Bur. & Q. \$3,619,233	\$3,236,701	I. \$382,532	11.8
Net earnings... 1,593,680	1,530,120	I. 63,560	4.2
Dan. & Norwak. 25,740	28,961	D. 3,221	10.4
N.Y., L. Erie, & W. 3,063,605	2,808,485	D. 255,120	9.1
Net earnings... 323,904	538,377	D. 214,383	4.0

Month of January:

St. Johns, & L. Ch.	\$12,640	\$16,763	D. \$4,123	24.2
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Month of February:

Chi. Bur. & Q. \$1,971,013	\$1,611,021	I. \$359,002	22.3

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working in alternate weeks has continued, and the agreement has been complied with by the companies more strictly than ever before.

Bituminous tonnages for the three months ending March 29, are reported as follows:

	1884.	1883.	Inc. or Dec.	P. c.
Barclay R. R. & Coal Co.	86,699	88,875	D. 2,206	2.5
Huntingdon & Broad Top.	46,622	58,850	D. 10,228	17.9
Cumberland, all lines.	444,856	453,867	D. 9,011	2.0
Bellefonte & Snow Shoe.	61,316	65,777	D. 4,461	6.6
Clearfield Region.	671,305	690,301	D. 18,996	2.9
Mountain Region, Pa. R.R.	103,926	139,361	D. 33,433	23.9
West Penna. R. R.	82,554	127,290	D. 44,736	34.4
Southwest Penna. R. R.	37,889	34,456	I. 3,433	10.0
Penn and Westmoreland.	302,945	348,998	D. 45,151	13.0
Monongahela R. P. R.	41,580	134,845	D. 27,511	20.4
Pittsburgh R. Pa. R. R.	65,745			

Total bituminous..... 1,047,418 2,130,718 D. 152,300 8.0

The general decrease in bituminous tonnage is most marked in those districts which depend largely on the iron furnaces and rolling mills for their market. In the Cumberland and Clearfield districts the tonnage is substantially the same as last year.

The Boston & Albany Railroad Co., it is said, has divided its yearly contract between Cumberland and Clearfield shippers. The Long Island Railroad will use Clearfield coal this year. The competition for the large contracts has been unusually sharp.

Coke tonnages for the three months ending March 29 are reported as follows:

	1884.	1883.	Inc. or Dec.	P. c.
Bellefonte & Snow Shoe.	6,408	3,662	I. 3,746	7.4
Mountain Region, Pa. R.R.	32,569	30,195	I. 2,674	8.9
West Penna. R. R.	23,487	25,891	D. 2,404	9.2
Southwest Penna. R. R.	326,120	475,057	I. 51,063	10.7
Penn and Westmoreland.	49,841	60,393	D. 10,552	17.6
Pittsburgh R. Pa. R. R.	18,135	I. 18,135
Connellsville, via Pa. R. R.	79,049	161,403	D. 82,354	51.0

Total coke..... 735,909 756,601 D. 20,692 2.9

These tonnages are all over the Pennsylvania Railroad and its branches, no other roads reporting.

The coal tonnage of the Pennsylvania Railroad Division, Pennsylvania Railroad, for the three months ending March 29 was:

	1884.	1883.	Inc. or Dec.	P. c.
Coal	2,340,666	2,251,245	I. 89,421	4.0
Coke	721,456	756,601	D. 35,145	4.6

Total..... 3,062,122 3,007,846 I. 54,276 1.8

This includes all tonnage, both that originating on the line and that received from other lines. It must be remembered that, the statement being made by weeks, that for 1883 includes two days more than that for the present year, so that the increase is really somewhat greater than shown above.

Actual tonnage passing over the Pennsylvania & New York road for the four months of its fiscal year from Dec. 1 to March 29 was:

	1884.	1883.	Inc. or Dec.	P. c.
Anthracite	359,928	327,408	I. 32,529	9.9
Bituminous	101,777	107,489	D. 5,712	5.3

Total..... 461,705 434,897 I. 26,808 6.2

The larger part of the anthracite is received from the Lehigh Valley road, of which this road is an extension.

Chicago coal receipts for the three months ending March 31 are given by the *Coal Trade Journal* as follows:

	1884.	1883.	Inc. or Dec.	P. c.
Anthracite	123,827	79,638	I. 44,189	55.2
Bituminous	640,011	655,798	D. 15,787	2.6
Coke	123,453	100,068	I. 23,385	23.3

Total..... 887,201 835,504 I. 51,787 16.2

The bituminous receipts this year include 155,710 tons Eastern, 41,478 tons Indiana and 342,823 tons Illinois coal. The decrease this year was about equally divided between the Illinois and the Indiana coal.

The coal tonnage of the Chesapeake & Ohio Railroad for two months ending Feb. 29 was:

	1884.	1883.	Decrease.	P. c.
Coal	137,922	144,491	6,569	4.5
Coke	10,767	19,441	8,674	45.5

Total..... 148,689 163,932 15,243 9.3

The coal this year included 279 tons cannel, 11,967 tons splint and block, 48,972 tons gas coal and 76,704 tons New River coal.

Cumberland coal shipments for the week ending April 5 were 59,896 tons. The total shipments this year to April 5 were 504,752 tons, against 502,704 tons to the corresponding date last year, an increase of 2,048 tons, or 0.4 per cent.

COTTON.

Cotton movement for the week ending April 4 is reported as follows, in bales:

Interior markets:	1883.	1883.	Inc. or Dec.	P. c.
Receipts	33,846	40,866	D. 7,020	17.2
Shipments	49,688	50,723	D. 1,035	2.1
Stock, April 4.	125,394	257,152	D. 131,758	51.2
Seaports:				
Receipts	37,001	78,708	D. 41,617	52.7
Exports	70,134	96,401	D. 26,267	27.2
Stock, April 4.	689,142	82,450	D. 133,308	16.2

The total cotton shipments from plantations for the cotton year (from Sept. 1) to April 4 have been 5,458,227 bales, against 6,461,481 bales last year, a decrease of 1,003,254 bales, or 15.5 per cent.

CHICAGO-ST. PAUL RATES.

The Northwestern Traffic Association has just issued the following tariff on business between St. Paul, Minneapolis Transfer, or Minneapolis and Chicago, Milwaukee, Joliet, Seneca, Peoria, St. Louis, Hannibal, Quincy, and Mississippi River points as far north as New Boston: First class, 60 cents; second class, 45 cents; third class, 35 cents; fourth class, 25 cents; fifth class, 20 cents; class A, 25 cents; class B, 20 cents; class C, 17½ cents; class D, 15 cents; soft lumber, 15 cents; salt, cement, etc., 10 cents; wheat and flour, 20 cents; other grain, 17½ cents; horses and mules, \$60; cattle or hogs, \$50; sheep, single deck, \$40; sheep in coops or crates tierced, \$50.

These are about the usual summer rates.

RULES OF CHICAGO-MISSOURI RIVER PASSENGER ASSOCIATION.

The association of general passenger and ticket agents of lines between Chicago and Missouri River points has agreed that charges of violation of their agreement concerning sales of tickets, made Feb. 4 last, shall be held in the order presented, except when adjourned by counsel, and that charges must be preferred not later than 5 o'clock of the day after the commission of the offence.

A committee consisting of Messrs. Charlton (Chicago & Alton), Lowell (Burlington) and St. John (Rock Island) was appointed to report a tariff for special excursion rates from Chicago to the Pacific coast.

The request of Commissioner Daniels, of the Colorado Traffic Association, to print a special form of tickets for Colorado excursions this season was declined.

It was resolved that half-rates on account of charity should be granted only on the advice of the General Passenger and Ticket Agent of each line, and the Chicago general agents of the lines whose headquarters are not in Chicago, on the application of the person to whom granted, and that such applications should be filed for reference.

The maximum commissions from April 1 on business from Colorado, Utah, Wyoming and New Mexico to Chicago and Milwaukee or points beyond are fixed at \$8 for first-class and \$2.50 for second and third-class tickets.

It was resolved that the application of C. M. Wicker, Commissioner of the Chicago Freight Bureau for reduced fares to country merchants to visit Chicago, could not now be entertained.

SOUTHEASTERN KANSAS POOL.

For some months past the rates from Wichita, Kan., and other Kansas points at which the Atchison, Topeka & Santa Fe and the St. Louis & San Francisco meet have been cut, and as the latter road has a line all the way to St. Louis, the cuts have affected the Southwestern Association lines, which carry to St. Louis the traffic of the Atchison road, and they have had to share in the cuts. Through the intervention of Commissioner Midgley, of the Association, conferences of the several companies concerned were held, and last week an agreement was made by which the tonnage at the competing points is to be divided hereafter between the St. Louis & San Francisco, the Atchison, Topeka & Santa Fe and the St. Louis, Fort Scott & Wichita.

BUTTER AND FISH BY MAIL.

The very low rates of the German parcels post (12 cents for 11 pounds for a considerable distance) are said to have caused an immense trade in the shipment of butter in 11-pound packages, and also of herrings, over 450,000 boxes of the latter having passed through the mail last year. For a commission of 2 per cent. the government assumes the risk of making collections, the sender receiving his cash at once on deposit of the parcel.

THE CHICAGO & GRAND TRUNK DENIES CUTTING RATES.

Commissioner Fink has issued the following circular:

"Referring to Joint Executive Committee Circular No. 596, in which one of the reasons given for the recent reduction in east-bound rates, under the rules of the committee, is that the Chicago & Grand Trunk Railway Company, March 18, 1884, took 200,000 bushels of grain from Chicago at a rate of not over 15 cents; the Chicago & Grand Trunk Railway, under date of March 31, 1884, informs this office that said charge is untrue. No evidence has been furnished to this office to sustain the charge, and there is every reason to believe that the information upon which this charge was made was not correct. The Chicago & Grand Trunk Railway also denies the charge contained in Circular No. 596, that the National Dispatch Fast Freight Line had reduced the rate on grass seed, and state that the charge was based upon a report made by a shipper that he could get a reduction of 12½ cents from tariff via the National Dispatch Line. The Chicago & Grand Trunk Line requests that a contradiction of these charges be put upon record, and in accordance with that request this circular is issued for the information of those to whom Circular No. 596 was addressed."

NORTHWESTERN TRAFFIC ASSOCIATION.

A meeting of the St. Paul committee of the Northwestern Traffic Association was held in St. Paul, April 4, to arrange details and fix the rates to local points on the lines represented in the association. There was a full representation and the meeting was harmonious. The matter of the division of traffic is now in the hands of Arbitrator Bogue, who is to make an examination of the several roads with terminal facilities, etc., before making his award.

CROPS.

The Ohio State Board of Agriculture reports that the area sown to winter wheat in that state is 2 per cent. less than last year, and that its condition this spring is 85 per cent. of a fully good condition, which if maintained until harvest would result in a crop of 34,786,000 bushels, against 25,884,000 bushels last year, and 43,453,000 in 1882, in which latter year the acreage of wheat was 11½ per cent. larger than this year.

Wheat sowing in Minnesota (and probably in Dakota also) has been possible about three weeks earlier this year than last, which is much more favorable for a good crop, especially in the Red River Valley and further west, where a June drought is common, which may greatly injure late sown wheat, but does little damage to that early sown.

Unofficial reports collected for the whole country concerning the acreage and condition of winter wheat show a considerable decrease in Ohio, Michigan and Illinois, compared with the area sown in 1882, but so much of that was winter-killed and plowed up in the spring of 1883, that it is not certain that there will not be as many acres to harvest this year as last. The acreage in New York, Pennsylvania, Indiana and Wisconsin is about the same as last year, but only in Pennsylvania and Indiana is the acreage ever very large. In the South some increase in acreage is reported. California has a larger acreage. Everywhere except in Georgia the wheat has passed the winter very well. In California the rains have been abundant, which insures a good yield unless there should be a season of the withering dry winds, when the grain is in the milk, which sometimes very greatly reduce the yield.

A NEW PITTSBURGH-CHICAGO LINE.

Arrangements have been made, to go into effect shortly, for the running of through passenger cars from Allegheny City to Chicago over the following lines: Pittsburgh & Western to New Castle Junction, from the latter place to Akron, via Pittsburgh, Cleveland, Toledo & Akron to Orrville, on the Cleveland, Akron & Columbus, and from Orrville to Munroeville by the Wheeling & Lake Erie. At Munroeville connection is made with the Baltimore & Ohio and thence on the latter line to Chicago. As soon as the Pittsburgh Junction road is completed it is said through cars will be run from Baltimore via Pittsburgh over the above route to Chicago.—*Chicago Tribune*.

RAILROAD LAW.

FREE PASSES IN MISSISSIPPI.

The Mississippi Legislature has passed the following law, which takes effect April 12:

"Section 1. That it shall be a misdemeanor for any legislative, executive, judicial or ministerial officer of this state, or for any person holding an office or place of honor, profit or trust under the laws of this state, to travel upon any railroad in this state without paying absolutely, and without any guise, trick, subterfuge or evasion whatsoever, the same fare required of passengers generally; and it shall also be a like misdemeanor for any officer or employé, or other person acting for such officer or employé, of any railroad in this state, to permit any such officer or person to travel upon any railroad in this state without paying fare as hereinbefore provided.

"Section 2. That any person found guilty of a violation of this act shall be punished as follows, to wit: For a first offense, by a fine of not less than \$25; for the second offense, by a fine of not less than \$100, or by imprisonment in the county jail not less than 10 days, or by both such fine and imprisonment; and, for the third offense, by a fine of not less than \$500, and by imprisonment in the county jail not less than 30 days; provided that nothing herein contained shall prevent any railroad from transporting persons free of charge, or at reduced rates, for any religious, charitable or benevolent purposes, or for any industrial exposition or association of a public nature."

OLD AND NEW ROADS.

Addison & Northern Pennsylvania.—This road is now in operation from Addison, N. Y., on the Erie road, to Gaines, Pa., a distance of 41 miles. There is also a branch 4½ miles long, leading to the coal mines at Gurnee. The spring time-table shows two trains running each way between Addison and Gaines and also a local passenger running between Addison and Westfield. An extension from Gaines to Pike Mills is in progress. The road is 3 ft. gauge, and its traffic is largely in coal. Most of this coal is carried over the road in standard-gauge cars which are transferred to narrow-gauge trucks at Addison.

Annapolis & Elkridge.—It is proposed to build a branch from this road near Annapolis, Md., to Bay Ridge, a noted summer resort. The distance is about 5 miles, and the work would be very light.

Attica, Lockport & Lake Ontario.—A preliminary survey of this line has been completed from Attica, N. Y., northward to Youngstown, on Lake Ontario, a distance of 48 miles. The engineers are now at work completing their plans and estimates.

Baltimore & Ohio.—This company has let a contract to Mr. L. F. McAleer for rebuilding the Pinkerton tunnel on the Pittsburgh Division, near Connellsville, Pa. Several years ago the wooden framework of this tunnel was destroyed by fire and the tunnel caved in, and the company built a road around the mountain in preference to rebuilding the tunnel. It

Cincinnati & Indianapolis companies, each to take one-third share in the property, which will be managed jointly as a union station for the three roads.

Cincinnati, Wabash & Michigan.—It is reported that the Cleveland parties who own this road are negotiating for a sale of the property. Offers, it is said, have been made by the Lake Shore Co., and also by the Erie, the latter company desiring it as a feeder to the Chicago & Atlantic. The railroad extends from Anderson, Ind., to Benton Harbor, Mich., 164 miles.

Cincinnati, Washington & Baltimore.—At a meeting of the board in Cincinnati, April 9, the directors approved the contract for the sale to the Marietta Mineral Railway Co. of the old line of the Marietta & Cincinnati road from point east of Athens to Moore's Junction, near Marietta, with the right to use the track of the Marietta Division from Moore's Junction to Marietta. The contract will be submitted to the stockholders for approval at a meeting called for May 10.

Coal & Iron, of West Virginia.—This company has been organized to build a railroad from Winchester, Va., to Davis, in Tucker County, W. Va., where it will connect with the extension of the West Virginia Central & Pittsburgh road. Among the incorporators are several connected with that company and with the Baltimore & Ohio.

Denver & Rio Grande.—At the annual meeting April 7, a report showing a surplus of \$150,000 over the fixed charges was presented. Resolutions were passed expressing a desire that harmonious relations with the Colorado Coal & Iron Co. be restored, and requesting the board to take such measures as may be deemed best for the interests of the company toward that end.

Durham & Lynchburg.—It is proposed to build a railroad from Durham, N. C., northwest through Roxboro to Danville, Va., about 40 miles. Durham is a large tobacco market and furnishes considerable traffic. It is also proposed to build the road to Lynchburg, about 95 miles, instead of going to Danville. The last is the line most favored, as it would secure a connection independent of the Richmond & Danville.

Elmira, Cortland & Northern.—The New York Railroad Commissioners have declared this road to be in an unsafe condition, and the attention of the officers of the company has been called to the matter. The road was recently sold under foreclosure, and the new company has had possession only a very short time, but has already begun to make the necessary improvements. The Railroad Commissioners have ordered that until new ties and rails have been laid over a considerable portion of the road trains shall not run over 10 miles an hour.

Grand Trunk.—At a meeting of the trainmen, held in Montreal last week to consider the general manager's proposition to reduce the wages 10 per cent. for three months, a resolution was unanimously passed to leave the service of the company rather than accept the offer. A committee was appointed to confer with the officers of the company, and a temporary agreement was made. The company will not reduce the wages for March or April provided the trainmen will agree to listen to a compromise afterwards.

Greenville & Laurens.—Chief Engineer Kirk reports that he has completed the preliminary survey of this line over the mountain section, and that a line has been found through Langford's Gap, which will require no grade over 70 ft. to the mile, and on which the road can be built with comparative cheapness. Another trial line is to be run through the mountains. After this mountain section is finished the rest of the work will be very light. The Committee on Location met at Greenville, S. C., April 7, and instructed the Chief Engineer to continue the work.

Kansas & Gulf Short Line.—The grading on this road is now completed from Tyler, Tex., southward to Jacksonville, 29 miles, and track is laid for 24 miles from Tyler. From Jacksonville southeast to Rusk 15 miles, there is an old road, formerly worked by horse-power, and this is to be used as part of the road, with the necessary changes. From Rusk the line will be extended southeast through Alto to a connection with the Houston, East & West Texas road at or near Nacogdoches. From Jacksonville to the Houston connection is about 60 miles.

Kentucky Central.—It is stated that a conference was held in Cincinnati last week between Mr. C. P. Huntington and a number of the local stockholders, which resulted in favorable action being taken on the proposition for an assessment of 10 per cent. to be levied on the stockholders for the purpose of raising money to be used for the completion of the extension of the road and the payment of the floating debt. It is said that several of the leading holders of the stock in Cincinnati who at first refused to pay the assessment have now agreed to this proposition. Most of the bondholders have also agreed to accept the proposition to reduce the interest from 6 to 4 per cent. for three years.

It is said that plans for the building of a bridge across the Ohio, which was proposed some time ago, have been discussed, and it has been agreed not to do anything in that direction at present, but to establish a new ferry transfer to be used until the construction of the bridge shall be decided upon.

Lansing, Alma, Mt. Pleasant & Northern.—Contracts have been let for grading this road from Alma, Mich., northward 10½ miles. The company hopes to have the road completed from Alma to Mt. Pleasant, 17 miles, by June next.

Louisville, New Orleans & Texas.—The new iron bridge over the Yazoo River was tested April 3, the result being entirely satisfactory. The deflection of the longest span in the centre was 1½ in. under the weight of 2,000 lbs. to the running foot. This span is 300 ft. long. The bridge was built by Clark, Reeves & Co. and has cost \$250,000, the foundations having been very extensive and difficult to build.

McPherson, Kingman & Fort Worth.—This company has been organized to build a railroad from McPherson, Kan., southward to Wichita, about 55 miles. An extension through the Indian Territory to Fort Worth, Tex., is proposed.

Maine Central.—This company recently sold in Boston \$450,000 of its new trust bonds at 97½ and interest. These bonds bear 5 per cent. interest and have 40 years to run and are secured by a deposit of bonds of the Maine Shore Line. There is a sinking fund of 1 per cent. annually.

Memphis & Little Rock.—In the United States Circuit Court in Little Rock, Ark., April 4, Judge Caldwell declined to appoint a receiver for this road, but made an order directing the sale of the road unless payment be made to the trustees within 30 days of the amount of the mortgage liens.

Mexican National.—An officer of the company makes the following statement:

"The Mexican National Construction Co. has franchises

for the building of about 2,000 miles in Mexico. It has also acquired rights to build 500 or 600 miles in Texas, of which 182 are now built. It has constructed to date 910 miles, nearly all of which is in operation. For road built and accepted in Mexico it receives from the government of Mexico a subsidy of \$11,350 per mile.

"The bond issues of the Mexican National Railway Co. are as follows:

"First-mortgage 6 per cent. gold bonds, bearing date April 1, 1881; amount issued, \$19,330,000.

"First-mortgage 8 per cent. gold bonds, bearing date July 1, 1882; amount issued, \$5,000,000.

"These issues are exactly the same bond, under the same mortgage deed, the date of the last issue being different from the first in order to adjust itself to a special English negotiation. * * *

"As you will see by the above recital, default in payment of interest due yesterday [April 1] was made only on \$19,330,000, the American issue, the interest on the \$5,000,000 English issue not falling due until July 1, 1884. About \$9,000,000 in interest have signed the waiver up to this time.

"Another issue of bonds has been recently authorized—second-mortgage debentures, bearing interest up to 5 per cent. per annum, payable April 1, if earned. These are to be issued at the rate of not over \$15,000 per mile, in settlement of adjustment of accounts between the railway company and the construction company, and for the purpose of facilitating negotiations for immediately securing the funds to construct the gap of 362 miles, which yet remains to connect the Northern and Southern divisions, and form the International Trunk Line Division, a continuous rail route to the United States."

Michigan Central.—This company has begun the work of relaying a large part of its main line with heavy steel rails, in order to meet the requirements of the traffic and the heavy engines now in use on the road.

Miramichi Valley.—A contract for grading this road has been let to Messrs. Clendenning & Ruel, of Marysville, N. B. The road is to run from Gibson, N. B., to Blackville, and thence to some point on the Intercolonial road.

Mississippi & Tennessee.—A dispatch from Memphis, Tenn., says that a controlling interest in the stock of this road has been bought by the Northwestern Improvement Co., which is chiefly owned by R. T. Wilson, of New York. The stock bought is the 9,000 shares held by the McComb estate, and the purchasers are said to have paid 66% for it. The road extends from Memphis to Grenada, Miss., 100 miles; it has no floating debt, is in good condition, and has generally earned a considerable surplus over the interest charges. It is understood that it will be controlled in the interest of the new Louisville, New Orleans & Texas road, in which Mr. Wilson is largely interested.

Missouri, Kansas & Texas.—Mr. H. M. Barry, a holder of bonds secured by the mortgage made by this company in March, 1876, has begun suit for injunction to restrain the company from paying interest on the \$20,000,000 general mortgage bonds. His complaint alleges that no interest has been paid on the first-mortgage bonds since the road was taken out of the hands of the trustee in 1880, but that the company is paying interest on the general mortgage bonds, although they are subsequent to the first mortgage.

Missouri Pacific.—A general reduction of 10 per cent. has been ordered in the salaries of all officers and employees receiving over \$100 per month. The order will not apply to trainmen of any class.

Mobile & Ohio.—Notice is given that holders of this company's Cairo Extension bonds can exchange them for the first mortgage extension bonds of the Mobile & Ohio Co. at the office of the Farmers' Loan & Trust Co. in New York.

Nashville, Chattanooga & St. Louis.—On the extension of the Centreville Branch of this road the grading is completed to Edna Furnace, Tenn., 10 miles beyond Centreville, and tracklaying has been begun.

The extension of the McMinnville Branch to Sparta, Tenn., is well advanced and the grading being nearly completed and the track laid 8 miles beyond the old terminus at Rock Island. The bridge over Caney Fork at Rock Island, on this branch, is one of the largest bridges in the south, being 795 ft. long and 128 ft. high. The longest span is 210 ft. A proposal is under consideration for the extension of this branch from Sparta about 10 miles to the Bon Air coal field.

Natchez, New Orleans & Northern.—This stupendous project is for a road from New Orleans to Natchez, Miss., and thence by way of Pine Bluff, Ark., and Kansas City to Bismarck, Dak., making a direct connection between New Orleans and the Northern Pacific. We are informed that it will take in all the principal cities west of the Mississippi in its course. The road is not likely to be built this year or next.

New Jersey Railroad Taxation.—After a disagreement between the two houses and the appointment of conference committee the New Jersey Legislature has finally passed the railroad tax bill as amended by the Senate, which, as already noticed, is a much less stringent measure than that which had first passed the House. The bill, in brief, provides that four state assessors are to be appointed, who are to assess all property owned by railroads in the state. On that part not used for railroad purposes the full local tax is to be collected. On that used for railroad purposes a local tax of 1 per cent. is to be levied, and a tax on the franchise, as heretofore, will be levied for state purposes. The road bed 100 ft. wide and all stations located thereon are to be exempt from local taxes, being covered by the tax on the franchise. Other exemptions in the old law, such as 10 acres at each terminus, were abolished. The effect of this act will be to increase considerably the state tax upon railroads, and also the local tax levied in those cities where there is much terminal property, such as Jersey City and Camden. It is said that the Governor will undoubtedly approve the bill, although it is not as sweeping a measure as he advocated.

New York Central & Hudson River.—Proposals will be received at the office of Chief Engineer C. H. Fisher in Albany, N. Y., until April 21 for altering and repairing the passenger station in Utica, and for furnishing and erecting iron sheds for the same. Plans and specifications can be seen at the office in Albany and at the office of the Division Superintendent in Utica.

New York, Lake Erie & Western.—Circulars have been issued in London to the shareholders of this company informing them that the voting trust has been terminated under the provisions of the reorganization of the company, a third dividend having been paid on the preferred stock. The holders are now entitled to exchange their beneficiary certificates for voting stock, and the certificates will shortly be ready for issue.

This company makes the following statement for Fe-

bruary and the five months of its fiscal year from Oct. 1 to Feb. 29 :

	February	1883	1882-83	Five months.—
1884.	\$1,496,394	\$1,283,616	\$0,479,301	\$8,137,722
Earnings . . .	1,258,173	1,049,816	7,382,518	5,757,072

Net earn. . . \$238,221 \$233,800 \$2,096,783 \$2,380,650
P. c. of expenses 75.0 81.8 70.8 70.7
This statement includes this year 68 per cent. of the gross earnings of the leased New York, Pennsylvania & Ohio road, and all the working expenses of that road, the 32 per cent. of the gross earnings paid as rental not appearing at all.

The company also furnishes the following statement, giving the earnings of the New York, Lake Erie & Western lines only, excluding all earnings and expenses of the New York, Pennsylvania & Ohio lines :

	February	1883	1882-83	Five months.—
1884.	\$1,233,409	\$1,283,616	\$7,728,300	\$8,137,722
Earnings . . .	925,062	1,049,816	5,472,900	5,757,072

Net earnings... \$308,347. \$233,800 \$2,255,405 \$2,380,650
P. c. of expenses 75.0 81.8 70.8 70.7
This shows for the five months a decrease of \$409,417, or 5.0 per cent., in gross earnings; a decrease of \$284,172, or 4.9 per cent., in expenses, and a resulting decrease in net earnings of \$125,405, or 5.2 per cent.

It is stated that a settlement has been secured in the suit of this company against James McHenry. Mr. McHenry surrenders the Cleveland, Columbus, Cincinnati & Indianapolis stock and other securities which were in dispute, amounting to about \$1,600,000 in all.

The freight brakemen on this company's leased New York, Pennsylvania & Ohio Line struck last week in consequence of an order which had been issued reducing the number of brakemen on each train from three to two. They claim that the work was very hard before and under the new rule it was made previously so, and that they were offered no additional pay for the additional work. No attempt was made to delay or stop passenger trains, but for two days last week the running of freight trains was entirely suspended. No violence was attempted by the strikers.

The strike ended April 7 in a compromise. The basis of the agreement is that the brakemen are to resume work under the new order allowing only two brakemen to a train. After 10 days' trial under this arrangement a decision as to the need of the third man is to be made by a committee to be composed of division superintendents, conductors, engineers and brakemen. The decision of this committee is to be final and binding upon both parties.

This company has made an arrangement with the Grand Trunk by which Pullman buffet cars will be run through between New York and Detroit by way of Suspension Bridge. These cars will leave New York at 6 p. m., reaching Detroit at 3 p. m. next day, and will leave Detroit on the return trip at noon.

New York & Long Branch.—The taking of testimony in the suit of the Pennsylvania Railroad Co. against this company and the Philadelphia & Reading was continued in Philadelphia April 4. The cross-examination of Mr. Williams, Assistant Comptroller of the Reading road, was continued, but did not result in any material change in his evidence, as heretofore noted. He said, however, that previous to the contract of January, 1882, the results of the operations of the Long Branch road were not profitable. The earnings had been considerable, and exceeded the expenses, but were not sufficient to pay interest on the bonds or any dividends on the stock. Mr. Williams further said that in this statement he had not included the receipts from rents, mail, and miscellaneous business, and had also omitted the business from non-competitive points as having no part under the contract with the Pennsylvania.

Mr. Max Riebenack, Assistant Comptroller of the Pennsylvania Railroad Co., was then examined and said that in the statements furnished on the other side Mr. Williams had divided the total business between the north and south of the Raritan River bridge on the basis of 43 and 57 per cent., which does not agree with the Pennsylvania figures. Mr. Riebenack presented a statement showing the earnings of that company north and south of the bridge had been in the proportion of 46 and 54 per cent. The same proportion, 43 and 57, has been used to determine the total of the local and non-competitive business, which was then deducted from the total earnings. The witness held that this could not be correct. Witness also said that the deduction of 70 per cent. for operating expenses is purely hypothetical and not borne out by actual results. This affected the result given as net earnings by Mr. Williams. The witness then presented a statement showing the operation under the first agreement from April 1, 1882, to May 31, 1883. The gross earnings of the Long Branch road were \$623,053, of which, under the agreement, 32 per cent. is to be set aside before any operating expenses were paid. The total amount guaranteed the Long Branch Co. under this agreement was \$240,333, deducting which from the gross earnings left a balance of \$381,720. The working expenses were \$526,180, leaving a deficit of \$144,430. The business contributed by the Central Railroad amounted to 70 per cent., and by the Pennsylvania to 30 per cent. Dividing the deficiency on this basis the Central Railroad would have to contribute \$109,101, and the Pennsylvania \$43,329, or if the amount paid by the Long Branch road for the Little Silver accident, which was \$100,834 be included, the proportion would be \$171,685 for the Central and \$73,579 for the Pennsylvania. Mr. Riebenack also produced figures to show that the Central Railroad derived much greater profit from the operation of the road than the Pennsylvania. He testified that from June 1 to Nov. 30, 1883, the proportion of traffic furnished by the Central was 59 per cent., and by the Pennsylvania 31 per cent., showing that the proportion of traffic furnished by the latter road is increasing and the previous inequalities of the contract passing away. He thought the operating contract perfectly equitable under the circumstances in which it was made. The pooling contract was made in order to equalize any attempt on either side to take advantage of the business, and if the returns had been as anticipated it would not have affected the operating contract. The object of it was to make it for the interest of each party not to interfere with the other, and the result of last summer's operation showed that this result was obtained. The hearing was adjourned until this week.

On April 8 the hearing was continued, when Second Vice-President Frank Thomson, of the Pennsylvania Railroad Co., was called by Judge Logan and examined as to the conditions under which the agreement of Jan. 2, 1882, was made with the Central Railroad Co. of New Jersey. He said that, when the new road from Bayhead to some point on the line at or near Newark was projected, overtures were made to his company to ascertain whether a joint use of the Long Branch Railroad could not be agreed upon in order to prevent the construction of a parallel road. After the terms of the contract had been agreed upon the officials of the Pennsylvania Railroad understood that there was a hesitancy on the part of the Jersey Central because of want of authority from the Chancellor to execute the agreement, and that when an order was given by that officer of the Court it was believed that that was a finality and that

the Jersey Central had all authority to proceed. There was no question then as to the conclusiveness of the agreement. The witness understood that the contract practically gave the Pennsylvania Railroad Company one-half ownership. "We bore our share of the guarantee," he continued; "our proportion of the expenses, and were to participate in the profits in proportion to the business we did, which I consider fair and equitable under the circumstances when the agreement was made in order to prevent the construction of a rival road." The pooling contract was an afterthought, as it had been objected that there might be too active competition between competitive points and the Long Branch road, and that the companies might be brought into such conflict in the rates that no profit would accrue to either. Mr. Thomson said he was opposed to the pooling contract because he believed that the Pennsylvania Railroad would eventually do more than one-half of the business. He said that the Central Railroad Co. had shown a disposition to retain all the business it could, instead of making a division of the trains and business, and had antagonized the spirit of the contract.

Either in the fall of 1882 or early in 1883 the witness called on President Little and pointed out to him that the Long Branch road was not earning its living, and urged the necessity for a better management. He told Mr. Little that the Pennsylvania Railroad Co. did not desire to make a strict settlement under the pooling contract, and that it would be willing to date it later in the year than April 1, the time originally contemplated. The witness also told the President of the Central Railroad Co. that there was too much train service, and that he wanted to join in a reduction of the expenses. Mr. Little said he was not familiar with the working of the contract, and was not then prepared to take up the question.

In answer to queries from Mr. Kaercher, Mr. Thomson said that the exact location of the proposed rival road had not been settled when the agreement was made. He did not know that it was planned to terminate the Receivership of the Central Railroad Co. prior to April 1, 1882, in order that the company could execute the agreement upon its own responsibility. Mr. Thomson thought that if the contracts had been faithfully carried out the operation of the road would have resulted in profit instead of a loss. He thought the operating expenses would have been much less had the Central Railroad Co. acted up to the spirit of the agreement.

The hearing was then adjourned for one week, until April 15.

New York & New England.—The Boston *Herald* of April 6 says: "The sub-committee of the directors has agreed upon a plan to raise the necessary funds to cancel all of the company's debts and place it upon its feet again, and will report to the full board April 29. Particulars are lacking, but it is understood that it contemplates offering 20,000 shares of preferred stock to shareholders, and parting with a portion of the second mortgage bonds in the treasury. From the proceeds it is expected that all debts can be liquidated, and a working surplus be left on hand. The measure will have to be voted on by stockholders, so that if the plan should be carried out it will require some months to get the property out of the hands of the court. It is believed that a market can be found for whatever securities shareholders do not want. The default on the car-trust interest and principal, due April 4, some \$160,000, has been previously noted. The Receiver had the money for the interest and taxes. Nobody can extend the principal except the holders of the bonds, and no provision is made for its payment."

New York, Ontario & Western.—Suit has been begun in the New York Supreme Court at Norwich, N. Y., to require this company to show cause why it should not rebuild and operate the branch from Norwich to Cortland. This branch was originally built as part of the Western Extension of the road, but its operation was unprofitable and after the present company took possession of the road it abandoned the branch and removed some of the rails. The suit now begun is in the interest of several of the towns along the line which issued their bonds in aid of the construction.

New York, West Shore & Buffalo.—In the Moore suit against this company and the North River Construction Co. the United States Circuit Court has given its decision to the State Court, in which it originated.

Ex Judge Ashbel Green, Receiver of the North River Construction Co., has issued his report to the stockholders and creditors of that corporation. He states the assets to be \$43,992,262, and the liabilities \$6,215,205. Among the items of assets are 200,355 shares West Shore stock, par value \$20,035,500; claims against the West Shore road, less amount of exceptions to completion of construction contract, \$9,288,501; income bonds of the West Shore road, par value \$10,000,000; 2,714 West Shore & Ontario Terminal Co. bonds, collateral for payment of \$1,507,000; 5,000 shares stock National Telegraph Co., par value \$500,000; loans and bills receivable, \$91,384; unpaid subscriptions to North River Construction Co. stock, \$229,340; open accounts, \$158,971; real estate estimated at \$60,000. The liabilities include \$3,459,334 of bills payable, and \$1,989,516 of open accounts, \$76,674 pay-rolls, and \$489,680 of engineer's estimates. The committee appointed at the suggestion of the Receiver to adjust the accounts between the construction and the railroad companies reported that the West Shore Co. owed the construction company \$7,666,974.98 over and above all counter claims. The officers of the West Shore Co. have suggested the following plan for a settlement:

"The railway company to make a second mortgage upon all its railroad property to secure an issue of bonds not to exceed \$25,000,000 in amount. Fifteen millions of bonds to bear interest at the rate of 5 per cent. per annum, or so much thereof as may be earned as net income from April 1, 1884, and after April 1, 1889, to bear a fixed interest at the rate of 5 per cent. per annum. The remaining \$10,000,000 of bonds to bear interest from April 1, 1884, at the rate of 5 per cent. per annum, payable semi-annually, April 1 and Oct. 1. Power of foreclosure to be vested in the holders of \$5,000,000 of bonds after 90 days default in the interest on such \$5,000,000 of bonds. In case of foreclosure the whole \$25,000,000 of bonds to become payable, principal and interest, and to share equally, without priority of preference. The \$15,000,000 of bonds first described to be used to the extent necessary in compromise and adjustment of all claims and demands of the North River Construction Co. against the railway company, and in connection with such settlement the \$10,000,000 of income bonds now held by the Receiver to be surrendered to be canceled."

In carrying out this plan it was further proposed that the first-mortgage bondholders shall fund three years' coupons, receiving 10-year debenture bonds, bearing 6 per cent. interest and redeemable at the pleasure of the company at 110, after three months' notice. The whole issue not to exceed \$7,500,000. The idea of paying a dividend to the construction company's stockholders April 1, 1884, was abandoned. Another proposition has been made to put the assets of the construction company in trust to secure debentures of the company to be issued to stockholders and creditors. This would have the advantage of terminating the receivership. A modification has been suggested, whereby holders

of unpaid debentures could exchange them, dollar for dollar, for second-mortgage bonds of the West Shore road, and to receive a bonus of 10 shares West Shore stock for each \$1,000 bond. All of those propositions have encountered opposition from certain of the creditors of the construction company.

North Pennsylvania.—Messrs. Drexel & Co., of Philadelphia, give notice that they have purchased from the North Pennsylvania Railroad Co. an amount of the general mortgage 7 per cent. bonds sufficient to provide for the first-mortgage bonds which will mature Jan. 1, 1885, and offer to holders of said maturing bonds to receive them at par and interest in exchange for the general-mortgage 7s at 125 and interest (at which price they will net about 5 per cent. per annum) to the amount of \$1,000,000. The excess over that amount in the purchase has been already absorbed by investors. Holders desiring to make the exchange will have allotments made to them in the order of their application.

Ohio & Mississippi.—This company gives notice that it will pay at the office in New York on and after April 7, the overdue coupons on the second consolidated mortgage bonds of this company, due April 1, 1878, Oct. 1, 1878, and April 1, 1879, with interest from maturity of coupons to Jan. 1, 1880, at 7 per cent., and from Jan. 1, 1880, to April 7, 1884, at 6 per cent.

The following circular has been issued by Supt. W. W. Peabody, President and General Manager, to the agents and employés of the company:

"Having been elected by the board of directors President and General Manager of this company, I have assumed the duties of those offices."

"The receivership heretofore existing having been terminated by order of the proper courts on March 31, and the railroad and other property restored to the control of the company, I now direct that all reports heretofore made to the Receiver shall hereafter be made to me."

"All accounts on and after April 1, 1884, will be kept in the name of the Ohio & Mississippi Railroad Co."

"All balances due the Receiver must be promptly collected and handed to C. S. Cole, Treasurer, with statement that the same are for Receiver's account."

"All employés of the Receiver will continue as employés of the company until further notice, and report, as usual, to the heads of their various departments."

Pennsylvania.—In Reading, Pa., April 4, the work of laying track on this company's new Schuylkill Valley line was temporarily stopped by the discovery that on the previous night the Philadelphia & Reading Co. had laid some new track across the line of the new road. A temporary injunction restraining further interference was hastily procured, and argument on the question of making the injunction permanent was to be heard this week.

Pike's Peak.—Work is in progress on the first section of this road, extending from Manitou, Col., to Crystal Park, a distance of 8 miles, and further sections will be let as soon as possible. The road is to run from Manitou to the summit of Pike's Peak. It will be 30 miles long, or very nearly five times the distance between the two terminal points on a direct line. The road will be almost a constant succession of curves, many of them very sharp, and will have an average grade of 270 feet to the mile. It is expected to be completed by the close of the coming season.

Pittsburgh, Fort Wayne & Chicago.—The special meeting called for April 3, to consider the proposition to issue mortgage bonds to take the place of the stock heretofore known as the special guaranteed stock which was issued to pay for the betterment of the road paid by the lessee has been adjourned to May 1.

Messrs. L. H. Meyer, George W. Cass and Charles Lanier have notified the stock and bondholders of the company that, to avoid abandonment of the plan for paying for improvement and additions to property with what has been termed betterment mortgage bonds, on account of legal difficulties, the following plan has been adopted: First, to deposit stock certificates with the trust company for exchange for bonds as the same are earned. Second, to vote in favor of a mortgage not to exceed \$22,000,000, to be issued under said mortgage only as required for betterments; bonds due at the option of the companies after 2,888, interest payable quarterly; bonds to be guaranteed, principal and interest, by the Pennsylvania Company, lessee. The consummation of this plan will settle forever all controversy. The proposition in the last circular for the issue of \$20,000,000 bonds is withdrawn, and all proxies should be withheld.

Portland & Ogdensburg.—The United States Circuit Court has appointed Gen. S. J. Anderson Receiver of this road in New Hampshire, confirming the action of the Maine Courts.

Richmond & Chesapeake.—This company has been organized to build a railroad from Richmond, Va., to a point on Chesapeake Bay near the mouth of the Potomac River, and directly opposite Crisfield, Md., the terminus of the Eastern Shore road. The road will be about 70 miles long, and the company proposes also to run steamboats from the terminus across the bay to Crisfield, a distance of about 22 miles.

Richmond & Chesterfield.—This company has been organized to build a short railroad to run from Petersburg, Va., to Exeter Mills, in Chesterfield county. Surveys for the road are to be made at once.

Richmond & Danville.—The Maryland Legislature has passed the bill authorizing the city of Baltimore to loan \$2,000,000 to this company, in order to secure an arrangement for making Baltimore practically the terminus of the road. The bill provides that the approval of the Mayor and Common Council, the Corn & Flour Exchange, the Board of Trade, and the Merchants & Manufacturers' Association must be given to the loan, and it must also be approved by a majority of the voters of the city. The conditions of the loan are that the Richmond & Danville agree to make Baltimore the northern terminus of its Virginia Midland line, and to furnish such facilities for the transportation as will best accomplish this result. A differential rate should also be allowed in favor of Baltimore on all freight, and the most favorable facilities shall be given for the transportation of passengers, mail and express between Baltimore and all points on the lines of this company's system. The city of Baltimore shall have the right to appoint annually three directors in the Richmond & Danville board and eight in the Virginia Midland board. The loan is to be expended upon improvements on the Virginia Midland road and in the improvement and extension of the Western North Carolina road. It is to run for 50 years, with interest at the rate of 6 per cent., and \$2,000,000 income bonds of the Virginia Midland road are to be deposited as security.

Among the improvements to be made on the Midland road, should this loan be approved as provided in the bill, will be an extension from Alexandria to Washington, including a new bridge over the Potomac River, making a direct rail connection with the Baltimore & Ohio and avoiding the present ferry transfer at Alexandria.

It is stated that the company has placed an order for 27,000 tons of steel rails with English mills, the rails to be

furnished as required. They are to be laid on the main line of the Virginia Midland road and also between Charlotte and Atlanta.

St. Catharines & Niagara River.—This company has a bill before the Canadian Parliament to authorize it to bridge the Niagara River between Queenstown and Lewiston. The act gives the company the power to construct and maintain a bridge across the Niagara River, provided a proper charter shall be obtained from the United States. The bridge is to be open for the traffic of all roads which may make connections with it at equitable rates of toll.

Securities on the New York Stock Exchange.—The Governing Committee has placed the following securities on the lists at the Stock Exchange:

Buffalo, New York & Philadelphia.—\$1,235,000 additional 6 per cent. general mortgage bonds.

Atchison, Topeka & Santa Fe.—\$848,000 additional 6 per cent. sinking fund secured bonds, Nos. 6,501-7,348.

Central Iowa.—\$1,520,000 Illinois Division 7 per cent. bonds.

Cleveland, Columbus, Cincinnati & Indianapolis.—\$4,500,000 general consolidated 6 per cent. mortgage bonds.

Oregon Short Line.—\$1,300,000 additional 6 per cent. first-mortgage bonds, Nos. 12,501-14,800.

Union Pacific.—\$3,000,000 additional collateral trust bonds bearing 5 per cent. interest, Nos. 5,001-8,000.

Sharpsville & Erie.—Surveys have been made for a road to run from Sharpsville, Pa., to Erie and the right of way for part of the distance has already been secured. The plan proposed is to run from Sharpsville to Greenville over the New York, Pennsylvania & Ohio, then to build a new road from Greenville to Girard and to use the Nickel Plate track from Girard to Erie.

Texas & St. Louis.—In St. Louis, April 4, the Cleveland Rolling Mill Co. obtained a judgment against this company for \$79,500 on a contract for the delivery of 15,000 tons of steel rails.

Toledo, Ann Arbor & Northern Michigan.—Track on this road is reported laid from Owosso, Mich., on the Detroit, Grand Haven & Milwaukee road, northwest to Elsie, a distance of 14 miles. Work is in progress from Elsie northward to St. Louis, about 25 miles.

Toledo, Cincinnati & St. Louis.—The Court has appointed Gen. J. D. Cox Master Commissioner to inquire and report the value of all the equipment and other property now in possession of the Receiver, also to report the nature and amount of all mortgages and liens upon the property.

Union Pacific.—The extension of the Colorado Central Division narrow-gauge line from Georgetown, Col., to Silver Plume, has been completed and opened for business. The extension is five miles long and is heavy up grade nearly the whole distance, the road ascending the mountain by a series of loops.

It is said that a third rail, standard gauge, will be laid on the Utah & Northern Branch from Ogden, Utah, to the junction with the Oregon Short Line at Pocatello, so that the road can be used as an additional connection between the main line and the Oregon Short Line.

Utah Central.—This company has decided to pass the quarterly dividend for April, this action being taken on account of the loss of earnings caused by competition with the Denver & Rio Grande road. The majority of the stock is held by the Union Pacific Company.

Virginia Midland.—A report was in circulation last week that a controlling interest in this company had been sold by the Richmond & West Point Terminal Co., to the Pennsylvania Railroad Co. This report has, however, been denied by the officers of both companies interested.

Western North Carolina.—The Raleigh *News and Observer* of April 6 says: "Four years ago the affairs of the Western North Carolina Railroad were at a low ebb. The state had purchased the road at auction sale under decree of the Federal court for about three-quarters of a million dollars, which was paid by mortgage bonds of the company, the state being bound for the interest. The cost of buying iron, cutting the tunnels and of construction generally was onerous, while the state had besides to furnish food and guards for the convicts, and the road was barely paying running expenses. Under that plan of proceeding it seemed as if the road would not be completed in this generation, and then, to add a still more sombre view to the situation, 'Mud Cut' threatened to be a quicksand in which a mint of money could be sunk without producing any visible effect. While hopes long deferred had almost made the hearts of the western people sink within them, a sentiment sprang up in other parts of the state that the work was too onerous for it to be pushed. It was just when the crisis was reached and the fate of this important railroad hung trembling in the balance, that private individuals stepped in and offered to complete it. And so four years ago a contract was made for its construction which, however, resulted in nothing for twelve months. But a year later, when the property passed under the control of Col. Andrews and his associates, work was begun in earnest. The mountains were pierced; the road was completed through the Alleghany to the Warm Springs and Wolf Creek—and the advantages of that through line have to some extent been realized. In the meantime progress has been made on the Ducktown Branch, the road-bed has been graded toward Murphy and Charleston, and work has been going on still further west. And now iron has been laid to Waynesville and arrangements were understood have been made to iron the rest of the track. All this has been done at no expense to the state, which has received compensation for the convicts at work upon the road, and which has been relieved of the necessity of paying interest on the bonds issued for its original purchase. This in itself, considering the benefits which the state derives from the early completion of the road, would render the contract under which the road has been built a good trade for the state; but, in addition, the state required the purchasers to guarantee the repayment of the amount of the Western North Carolina Railroad Co. owed it for advances and for the labor of convicts before the sale four years ago. And that amount is to be paid at an early day. The understanding is that it will be handed over to the Public Treasurer by May 1. The amount is \$600,000. Altogether the state has reason to congratulate itself on that trade, and the editor of the *News and Observer* observes with pleasure that he advocated it warmly."

Wisconsin, Iowa & Nebraska.—Dispatches from Des Moines, Ia., state that an arrangement has been completed for the consolidation of this company with the Des Moines, Osceola & Southern road under the name of the Wisconsin, Iowa & Southwestern. The Wisconsin, Iowa & Nebraska is completed from Cedar Rapids to Marshalltown, 82 miles, and the Osceola road is completed from Des Moines to Cainesville, Mo., 124 miles. The last named road is of 3 ft. gauge, but it is said will be changed to standard gauge and extended to St. Joseph, Mo., during the present season.